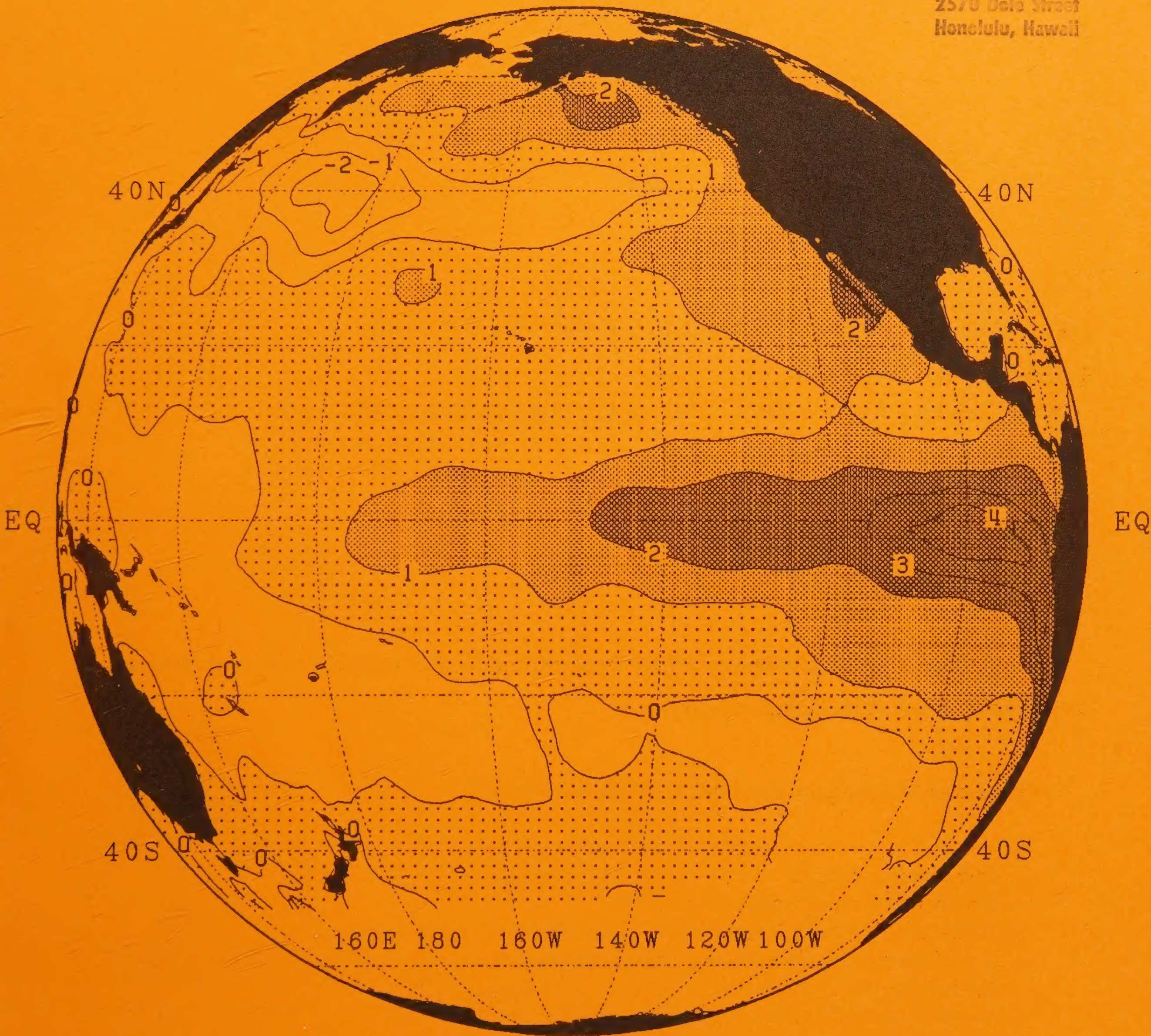
気象庁海洋月報

Monthly Ocean Report

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Climate and Marine Department
Japan Meteorological Agency

気象庁 気候・海洋気象部

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気象庁海洋月報は、気象庁 気候・海洋気象部 海洋課で作成されています。
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表紙は、1997年8月の太平洋の月平均海面水温偏差図です。
陰影部は、平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for August 1997 in the Pacific Ocean.
Areas of positive anomalies are shaded.

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海況の特徴（１９９７年８月）

日本近海の海況

海面水温は全般に平年より低く，北海道東方及び，常磐沖から東海にかけての沿岸では，平年より1℃以上低かった（第4図）。

黒潮は，九州から紀伊半島にかけて接岸した後，東に流れ，上旬から中旬にかけては，八丈島付近を経て33°N，142°E付近に達した後，北西に向かい房総半島沖を北東に流れていたが，下旬には，伊豆半島沖から三宅島付近を経て，房総半島沖を北東に流れていた（第9図）。

本州東方の親潮系の冷水は，沿岸の分枝は40°N，143°Eまで，沖合の分枝は39.5°N，144.5°Eまで，それぞれ達していた。また，常磐沖の37°N，142.5°Eにも親潮系の冷水が見られた（第5図）。

太平洋の海況

太平洋赤道域の海面水温は，175°W以東で平年より1℃以上高く，150°W以東では2℃以上高かった。また，110°W～90°Wでは，+4℃以上の正偏差も見られた。エルニーニョ監視海域（4°N～4°S，150°W～90°W）の偏差は先月からさらに増大して+3.1℃になった（第1表）。これは，1949年以降では1982年12月(+3.3℃)，1983年1月(+3.2℃)に次ぐ記録である。一方，西太平洋赤道域では160°E付近を中心に-0.5℃以下の負偏差域が広がった（第16図）。

北太平洋では，40°N付近の負偏差は先月よりも強まり，165°Eから日付変更線にかけて-2℃以下の負偏差が見られた。50°N以北，165°E以東では平年より+0.5℃以上高い状態が続いていた。北米沖は+1℃以上の正偏差に覆われて，カリフォルニア半島沖には引き続き+2℃以上の正偏差域が見られた。アラスカ湾の+2℃以上の正偏差域は先月より狭まった（第16図）。

Highlights August 1997

Seas adjacent to Japan

Negative SST anomalies prevailed in seas adjacent to Japan. In particular, SSTs were more than 1°C below normal east of Hokkaido and along the coast from Joban to Tokai (Fig. 4).

The Kuroshio flowed along the coasts from Kyushu to Kii Peninsula. During the first and second 10-day of the month, it passed near Hachijo Island, then flowed NE-ward off Boso Peninsula. In the last 10-day, it passed near Miyake Island, then flowed NE-ward off Boso Peninsula (Fig. 9).

Coastal and off coastal branches of the Oyashio cold water extended southward to 40°N, 143°E and 39.5°N, 144.5°E, respectively. Another Oyashio cold water was observed off Joban around 37°N, 142.5°E (Fig. 5).

Pacific Ocean

In the equatorial Pacific, SSTs were more than 1°C above normal east of 175°W, and positive SST anomalies more than +2°C were observed east of 150°W. Positive SST anomalies exceeding +4°C were found between 110°W and 90°W. The SST anomaly for the El Niño monitoring region (4°N-4°S, 150°W-90°W) increased to +3.1°C, the third largest value since December 1982 (+3.3°C) and January 1983 (+3.2°C) observed dating back to 1949. The area of negative SST anomalies less than -0.5°C expanded around 160°E in the western equatorial Pacific (Fig. 16).

In the North Pacific, negative SST anomalies along 40°N intensified, and those less than -2°C were found between 165°E and the date line. SSTs were more than 0.5°C above normal in the region north of 50°N and east of 165°E. Positive SST anomalies more than +1°C prevailed along the North American coast, and those exceeding +2°C persisted off Baja California. The area of positive SST anomalies exceeding +2°C was reduced off the Gulf of Alaska (Fig. 16).

凌風丸による137°E線に沿った海洋観測

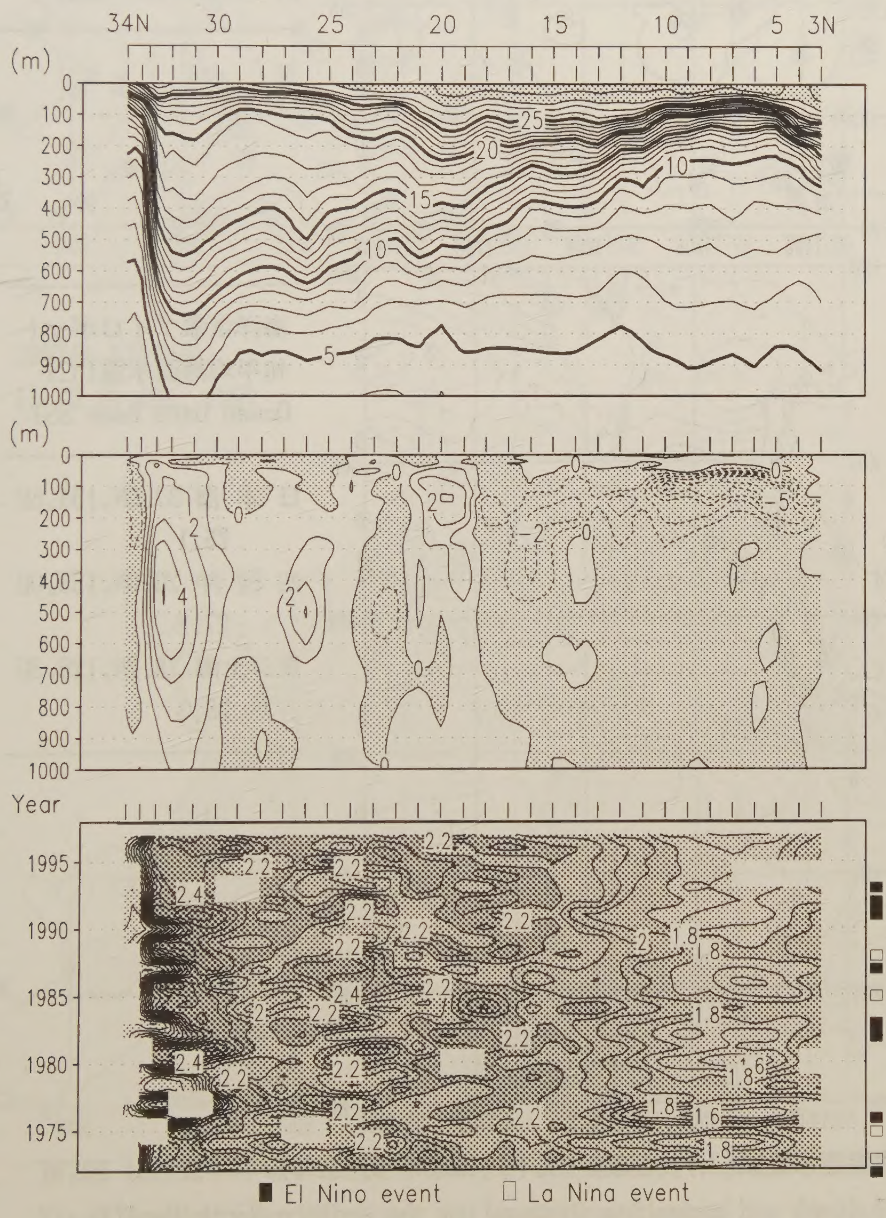
Oceanographic observations along 137°E by the R/V Ryofu Maru

気象庁の観測船「凌風丸」は，1997年6月から7月にかけて，北西太平洋の137°Eに沿った海洋観測を行った。この137°Eに沿った海洋観測は冬季は1967年，夏季は1972年より毎年続けられている。

今回の観測では5°～10°Nにかけて水温躍層が平年より浅く，100m深付近で最大5°Cの負偏差域となっていた。このため，力学的海面高度は$1.6 \times 10m^2/s^2$と，平年より低かった。このような状態は過去のエルニーニョ現象時にも見られた。(図A下)。

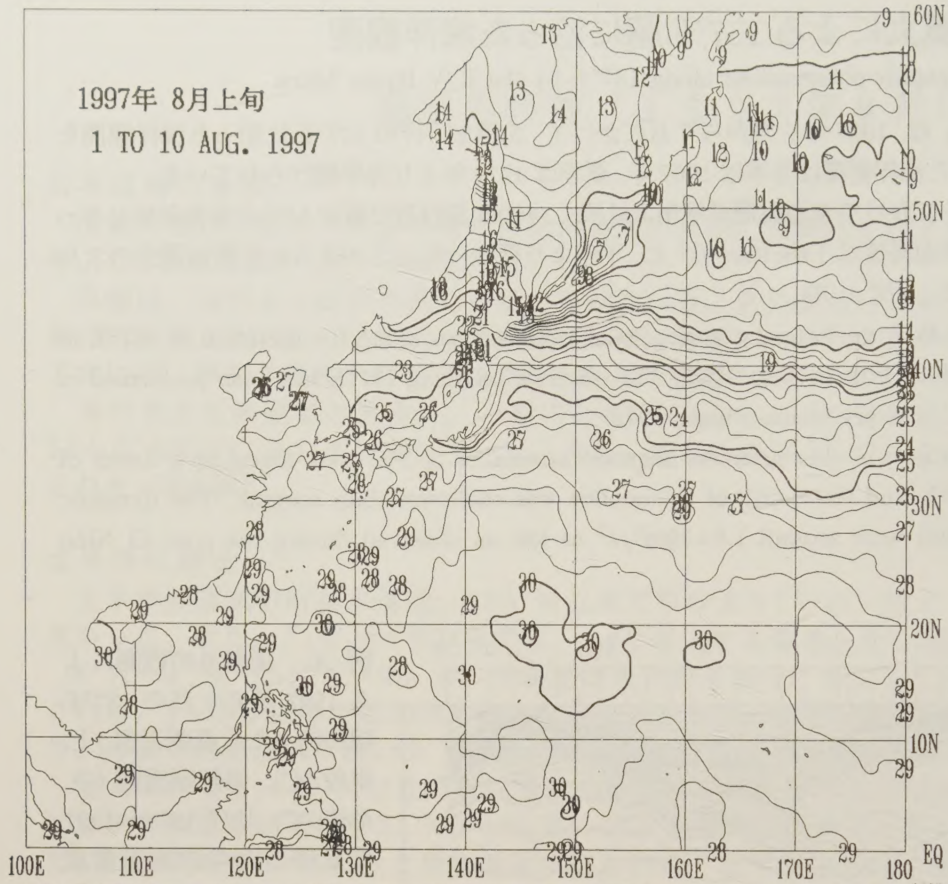
The R/V Ryofu Maru of JMA performed oceanographic observations along the meridian of 137°E in the western North Pacific from June to July, 1997. The observation along 137°E has been performed in every winter since 1967 and in every summer since 1972.

According to the observations in this summer, negative anomalies of 5°C were found at a depth of 100m between 5°N and 10°N and the depth of themocline was shallower than normal. The dynamic heights in the tropical region were around $1.6 \times 10m^2/s^2$ as low as observed during the past El Niño events (Fig. A, bottom).



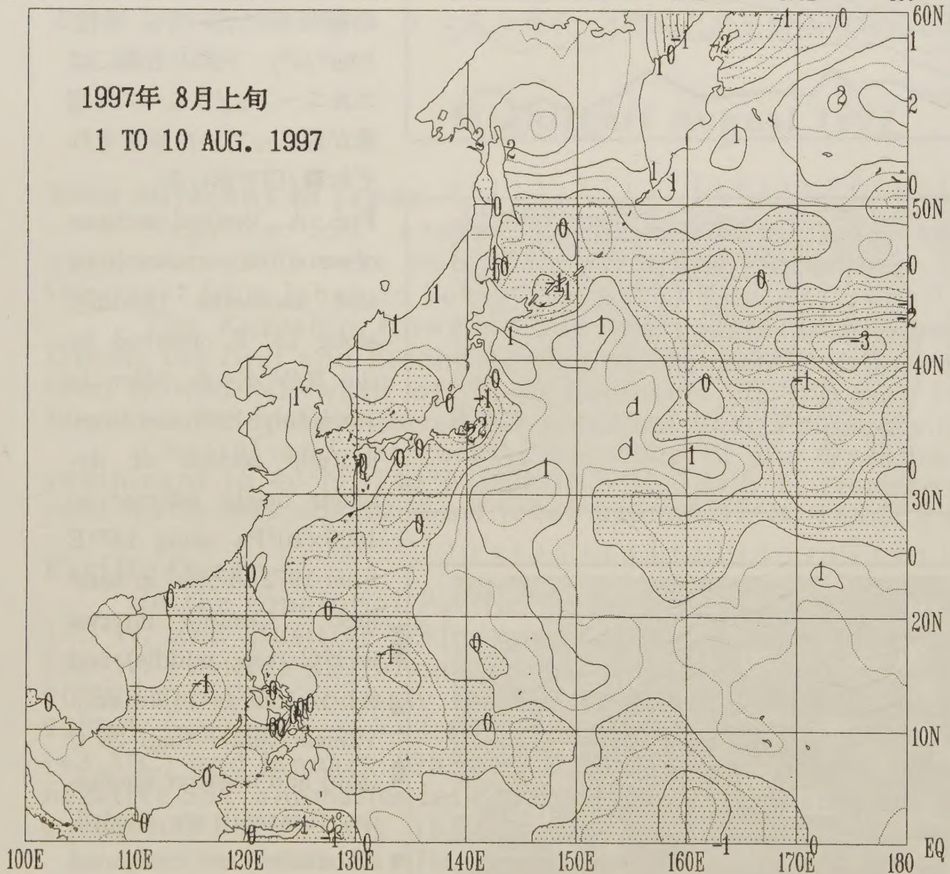
図A. 凌風丸の観測による1997年6/7月の137°E線に沿った水温断面図（上，単位:°C），偏差断面図（中，単位:°C）及び1972～1997年夏季の力学的海面高度の経年変化図（下，単位:$10m^2/s^2$）。下図の右端にはエルニーニョ/ラニーニャ現象が起こっていた年をそれぞれ■/□で示した。

Fig. A. Vertical sections of water temperature (top) and anomalies (middle) along 137°E observed by the R/V Ryofu Maru in June/July, 1997 and time-latitude section of dynamic height referred to 1000×10^4Pa along 137°E from 1972 to 1997 in summer. Contour interval is 1°C (top, middle) and $0.1 \times 10m^2/s^2$ (bottom). Values greater than 28°C (top) and negative anomalies (bottom) are shaded. Anomalies are computed from the 1972-1990 base period.



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	28.1	-1.0
御前崎(47655)	23.1	-2.8
八丈島(47678)	25.8	-0.9
小名浜(47598)	19.9	-0.5
宮　古(47585)	20.5	1.9
江　差(47428)	24.8	-
浜　田(47755)	25.9	-

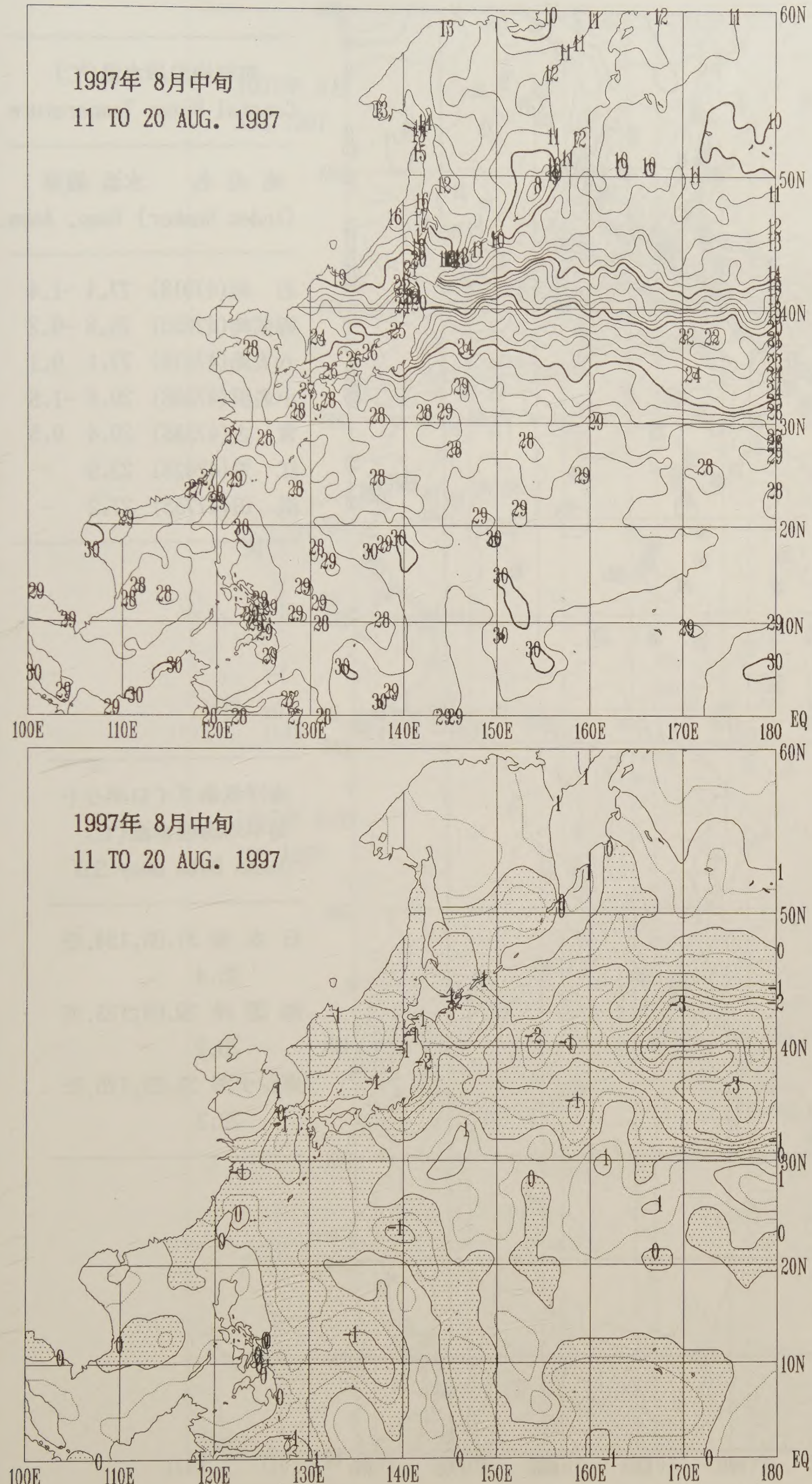


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,134.5E	25.1
四国沖	29.0N,135.0E	27.2
東シナ海	28.2N,126.3E	28.3

第1図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1997年 8月上旬)

Fig.1 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 1st ten-day period in AUG 1997. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

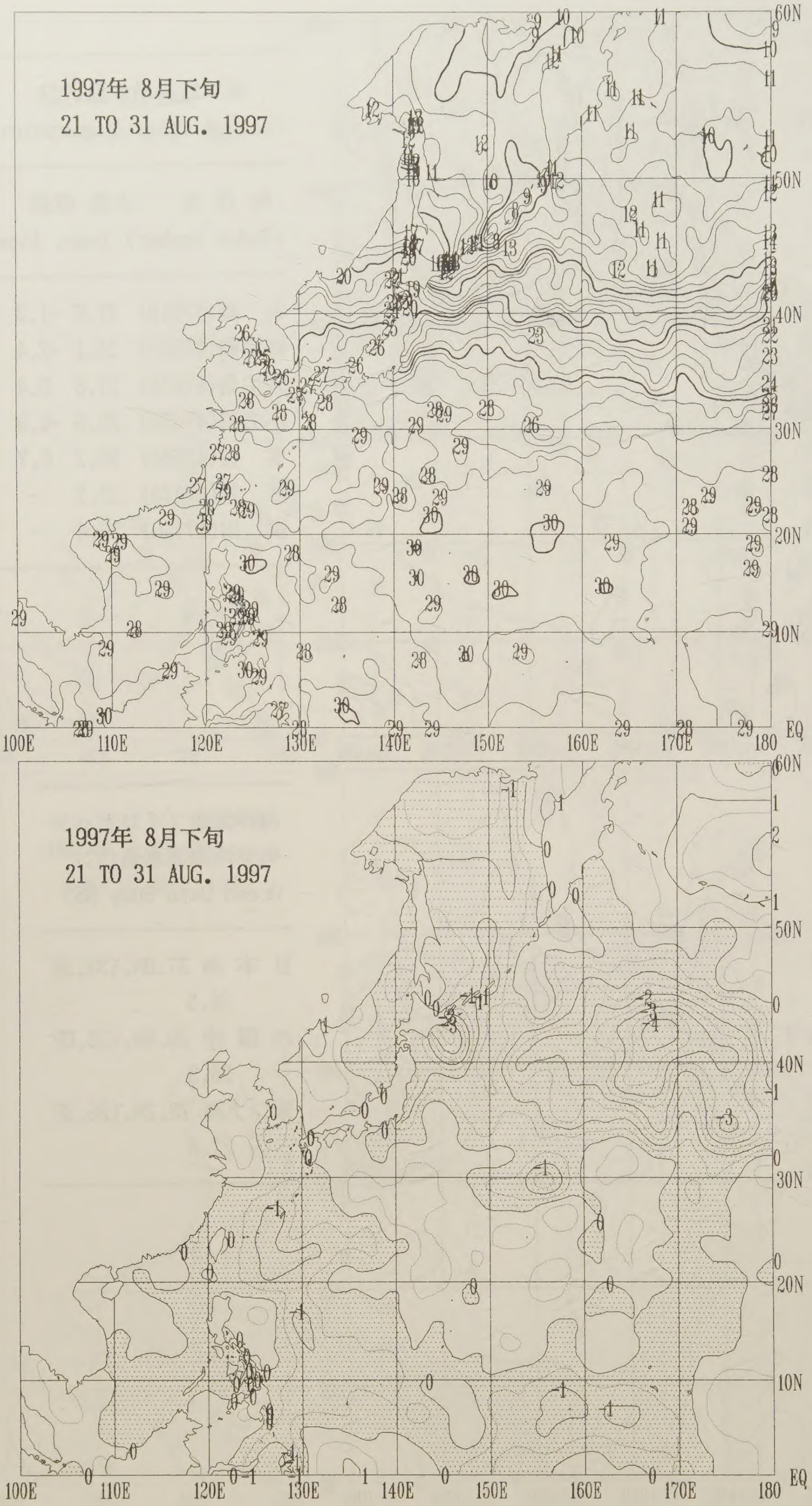
地 点 名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	27.6	-1.3
御前崎(47655)	24.1	-2.4
八丈島(47678)	27.5	0.4
小名浜(47598)	20.5	-0.9
宮　古(47585)	20.2	0.7
江　差(47428)	23.2	-
浜　田(47755)	26.4	-

海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

地点	位置	水温
日 本 海	37.9N,134.5E	24.5
四 国 沖	29.0N,135.0E	28.3
東シナ海	28.2N,126.3E	27.8

第2図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1997年 8月中旬)

Fig.2 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 2nd ten-day period in AUG 1997. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.

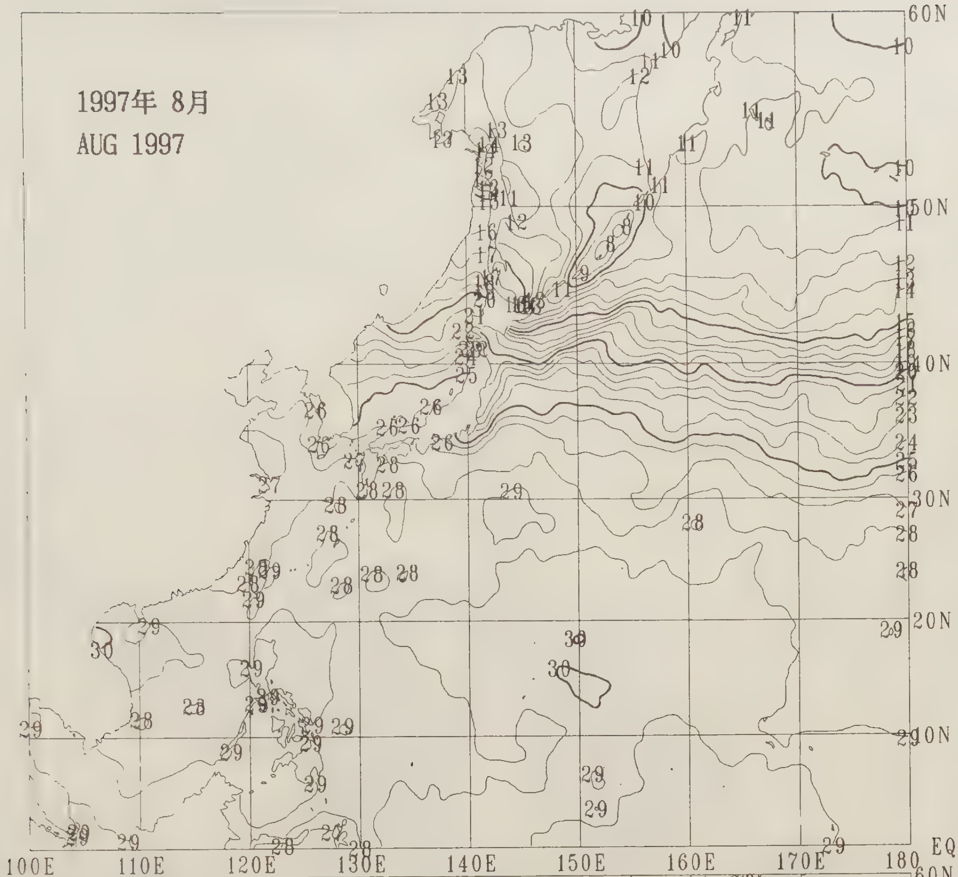


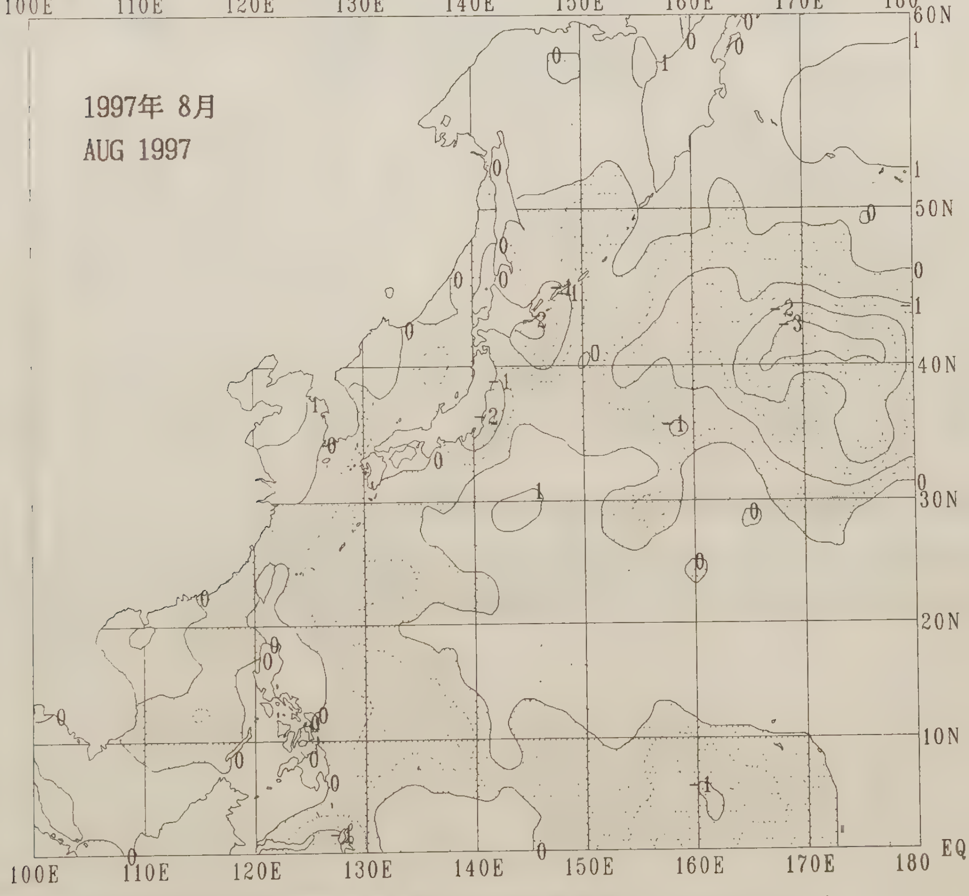
旬平均沿岸水温(℃) Coastal Water Temperature		
地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	27.4	-1.4
御前崎(47655)	25.8	-0.2
八丈島(47678)	27.1	0.1
小名浜(47598)	20.6	-1.6
宮　古(47585)	20.4	0.5
江　差(47428)	23.9	-
浜　田(47755)	27.2	-

海洋気象ブイロボット 旬平均海面水温(℃) Ocean Data Buoy SST	
日本海 37.9N,134.5E	25.4
四国沖 29.0N,135.0E	29.2
東シナ海 28.2N,126.3E	28.3

第3図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1997年 8月下旬)

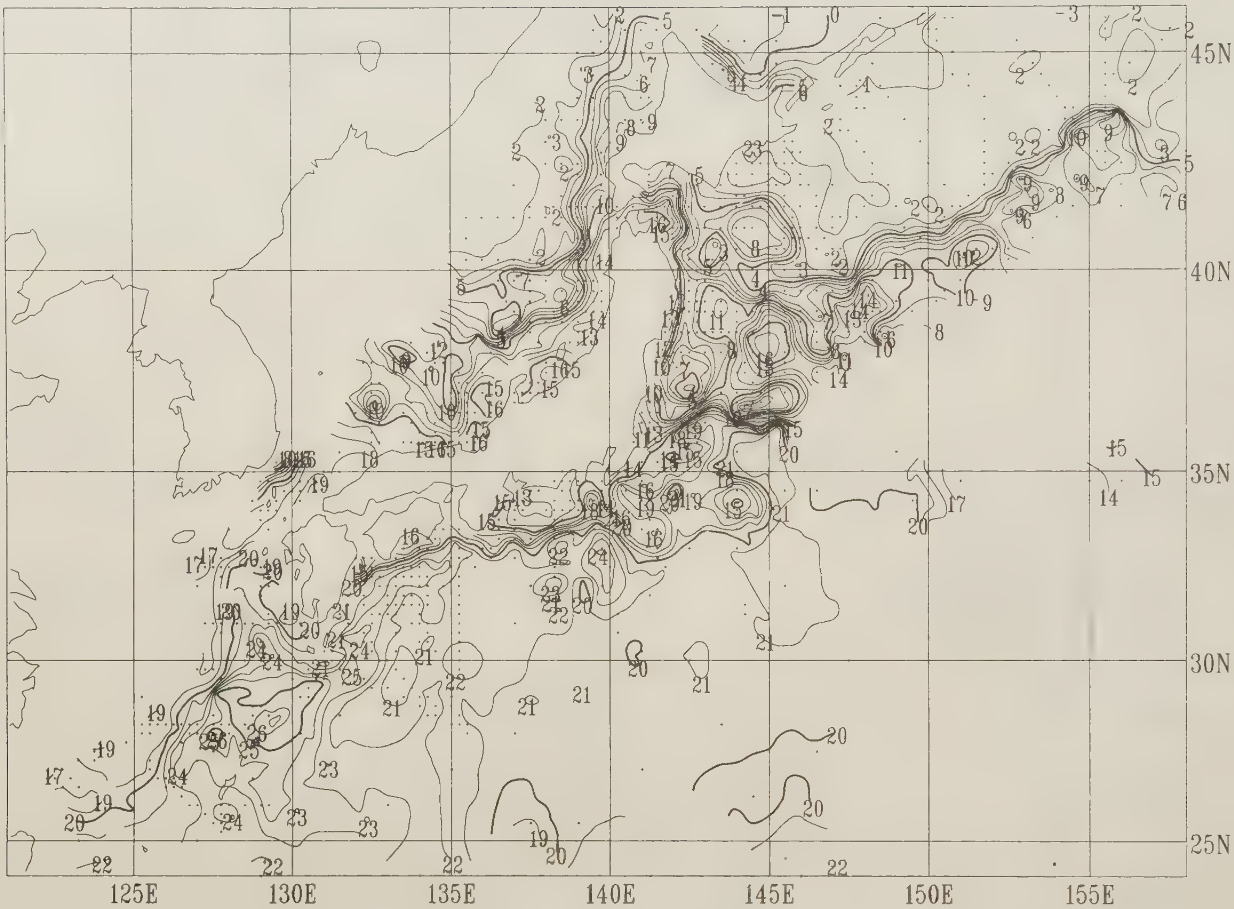
Fig.3 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 3rd ten-day period in AUG 1997. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.





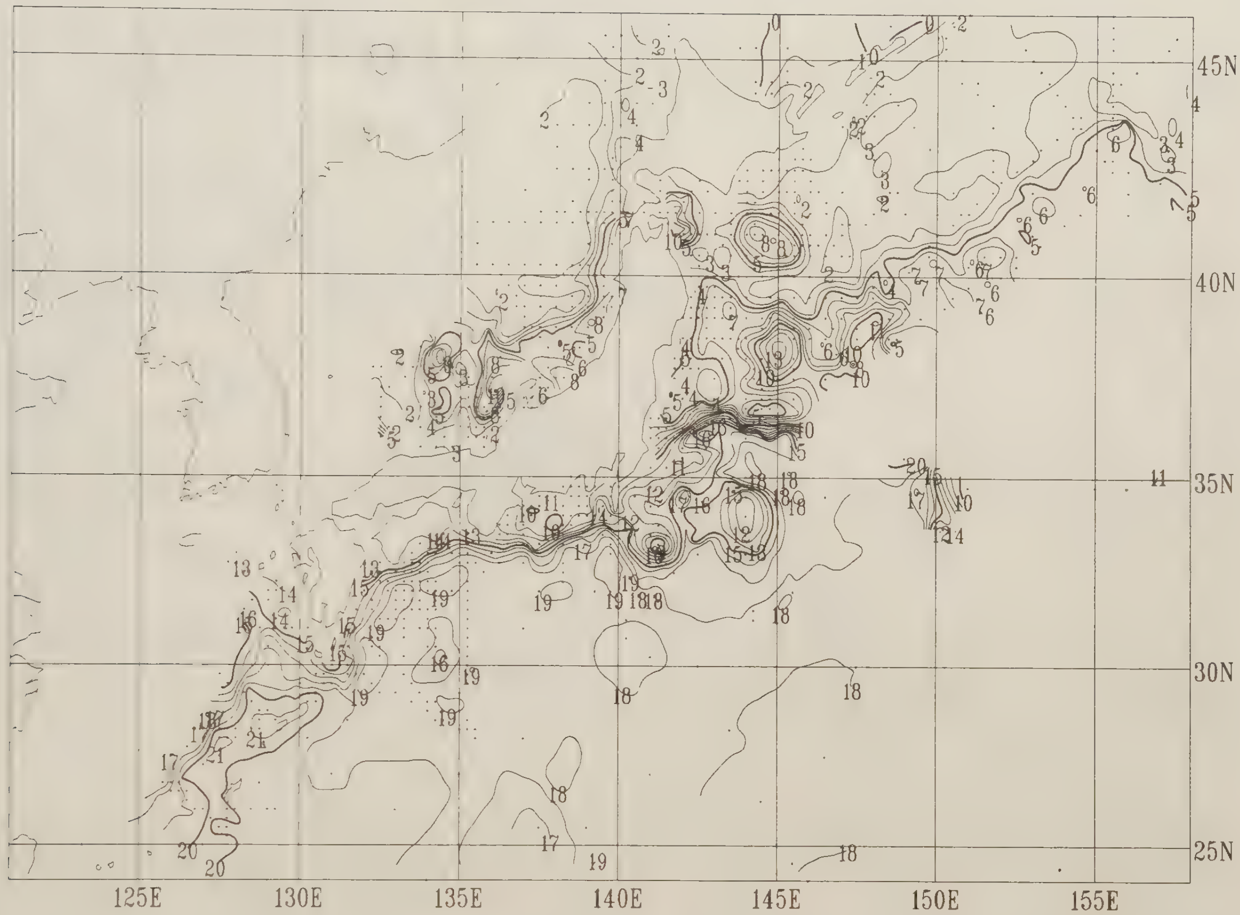
第4図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1997年 8月)

Fig.4 Monthly mean SST (top) and anomalies (bottom) in the western North Pacific for AUG 1997. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



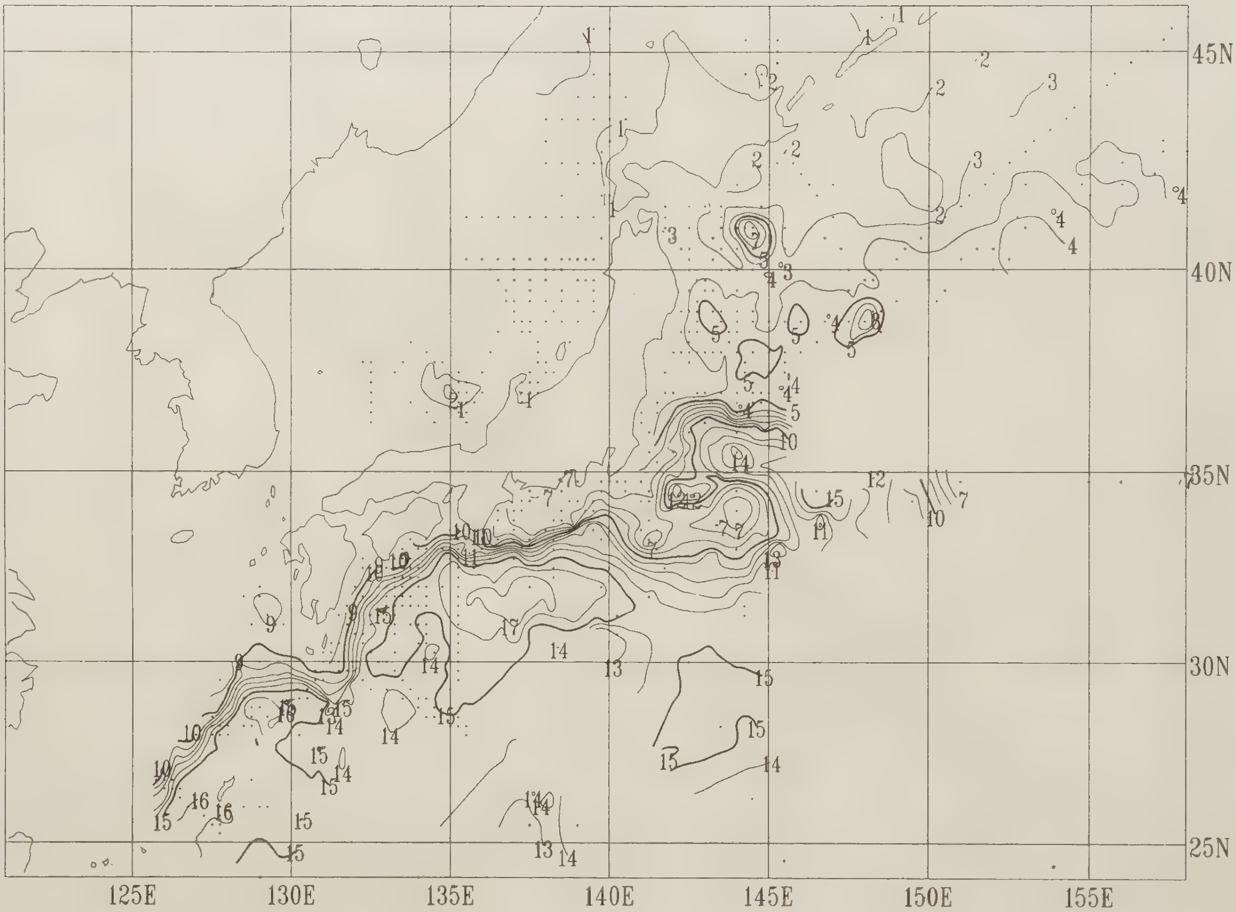
第5図　日本近海表層水温図(深さ100m) (1997年 8月)

Fig.5 Subsurface (100m) temperatures in the seas adjacent to Japan for AUG 1997. Contour interval is 1°C. Observation points are denoted by dots.



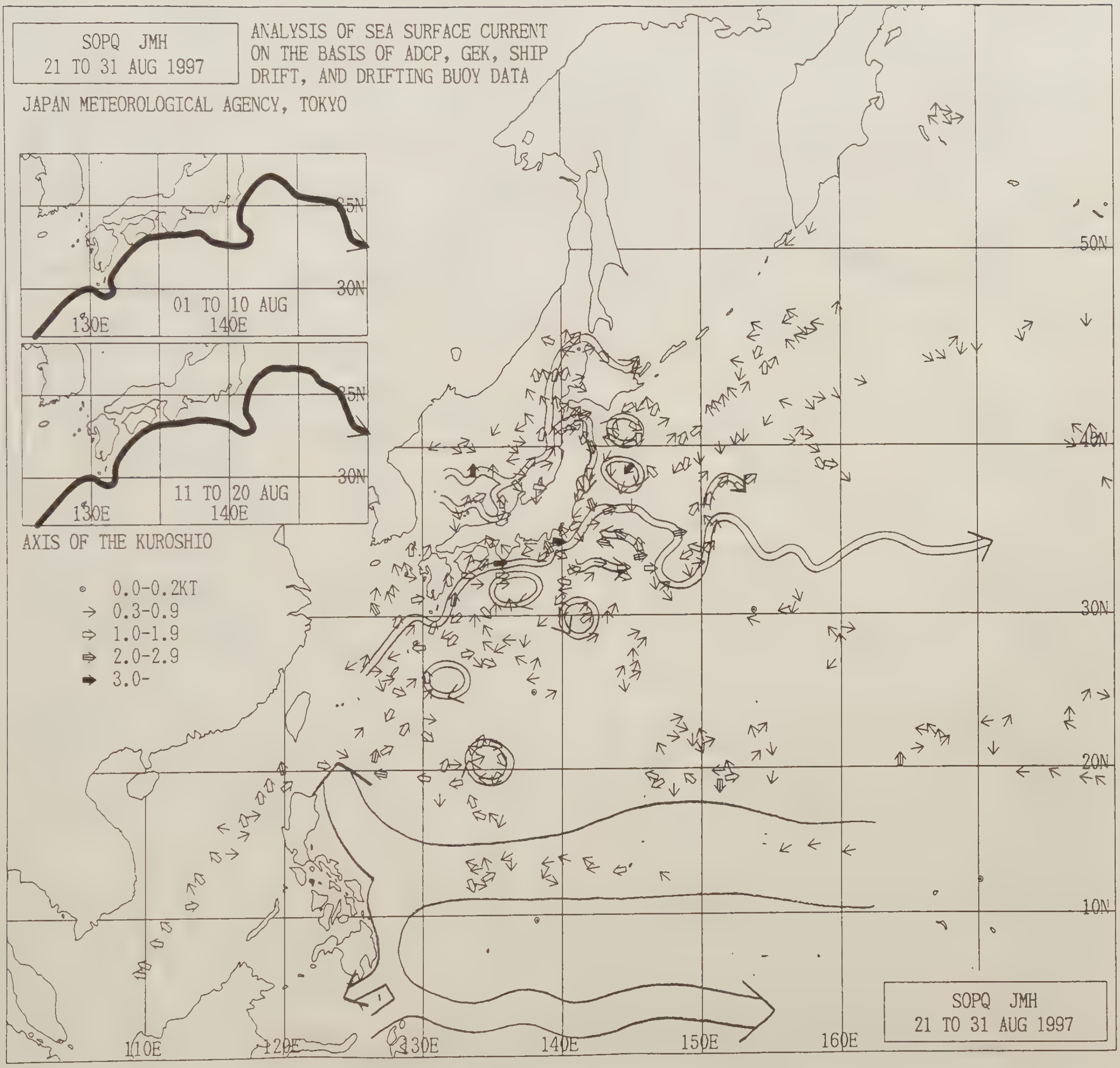
第6図　日本近海表層水温図(深さ200m) (1997年 8月)

Fig.6 Subsurface (200m) temperatures in the seas adjacent to Japan for AUG 1997. Contour interval is 1°C. Observation points are denoted by dots.



第7図　日本近海表層水温図(深さ400m) (1997年 8月)

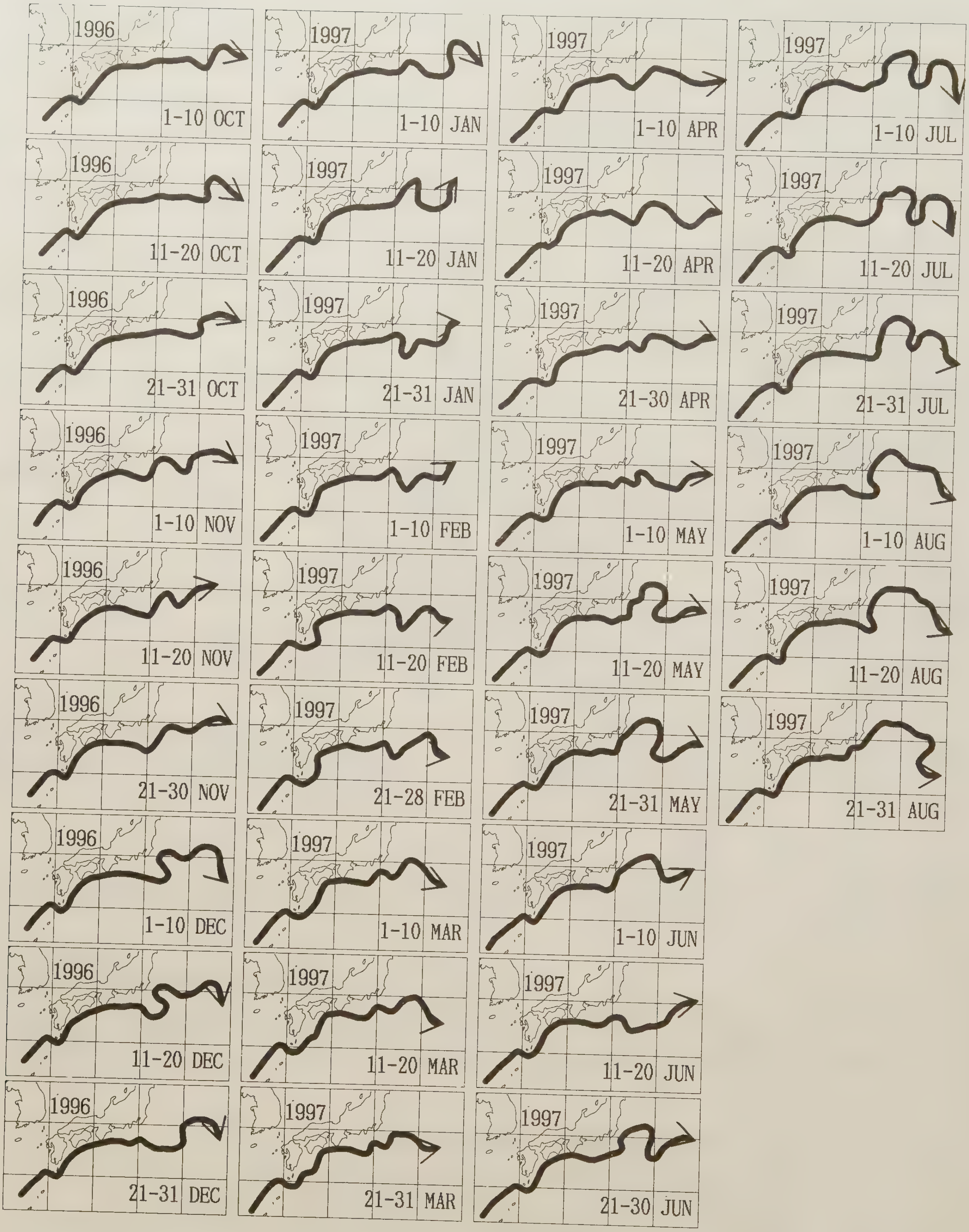
Fig.7 Subsurface (400m) temperatures in the seas adjacent to Japan for AUG 1997. Contour interval is 1°C. Observation points are denoted by dots.



第8図　北西太平洋海流図（1997年 8月下旬）

Fig.8 Analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in AUG 1997. Small arrows indicate in situ observations. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.

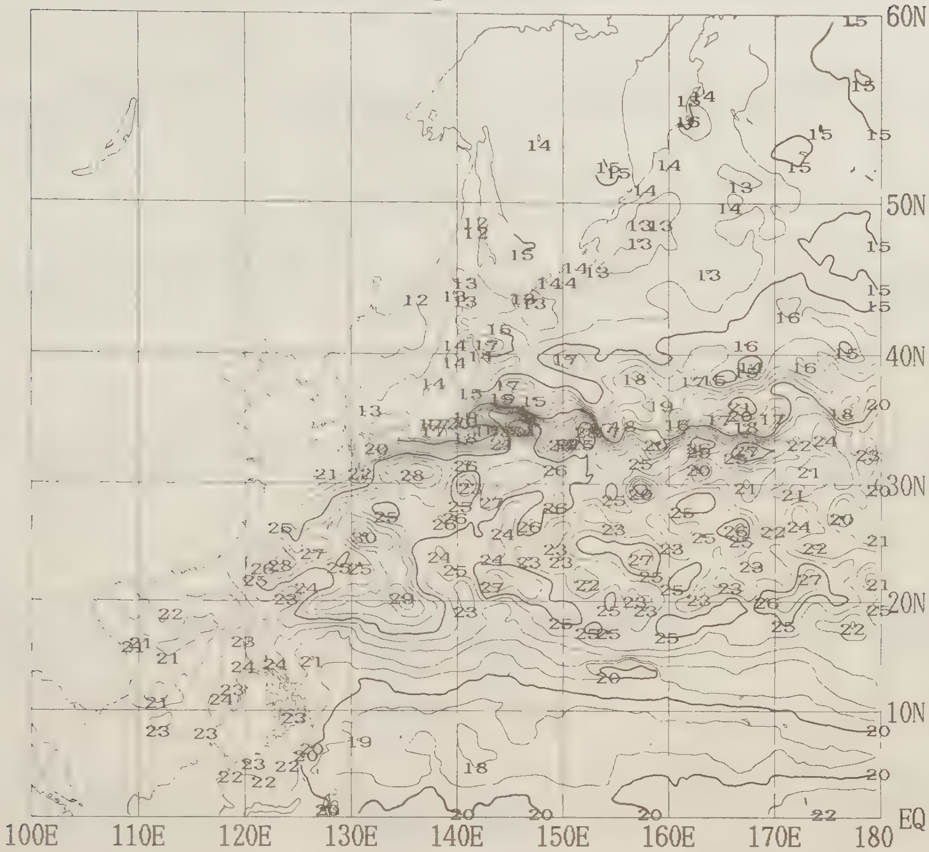
Location of the Kuroshio axis



第9図 旬別黒潮流軸図

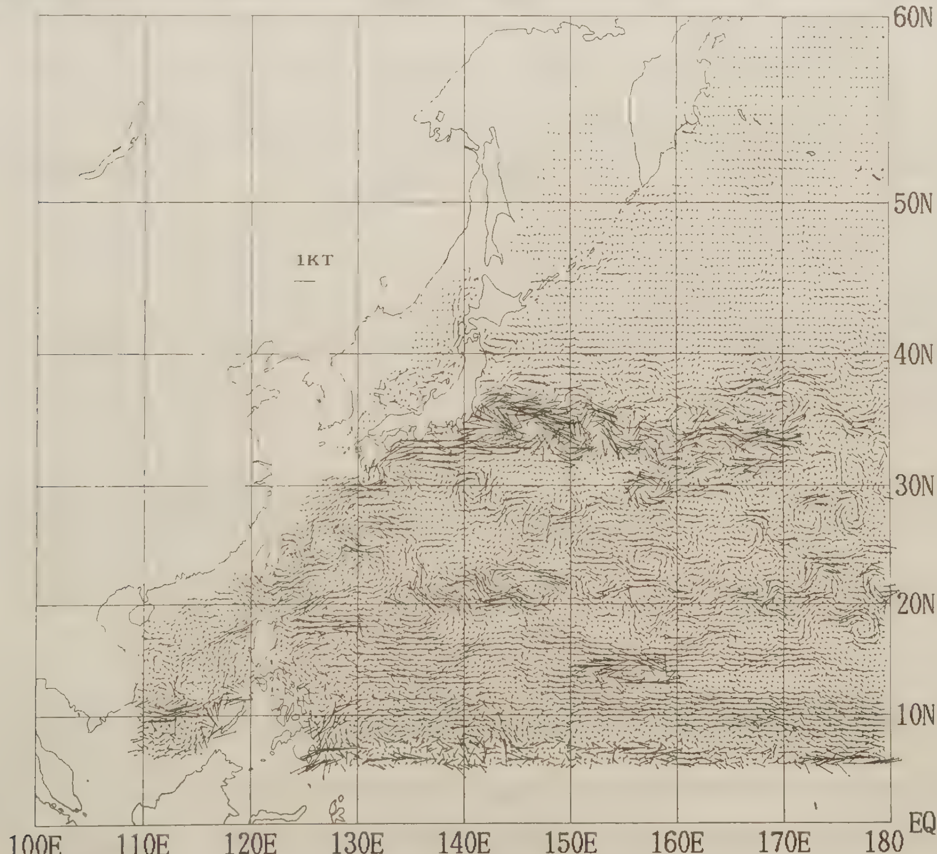
Fig.9 Location of the Kuroshio axis

Sea surface dynamic heights and current distribution



第10図 北西太平洋力学的海面高度分布図(1997年 8月27日)

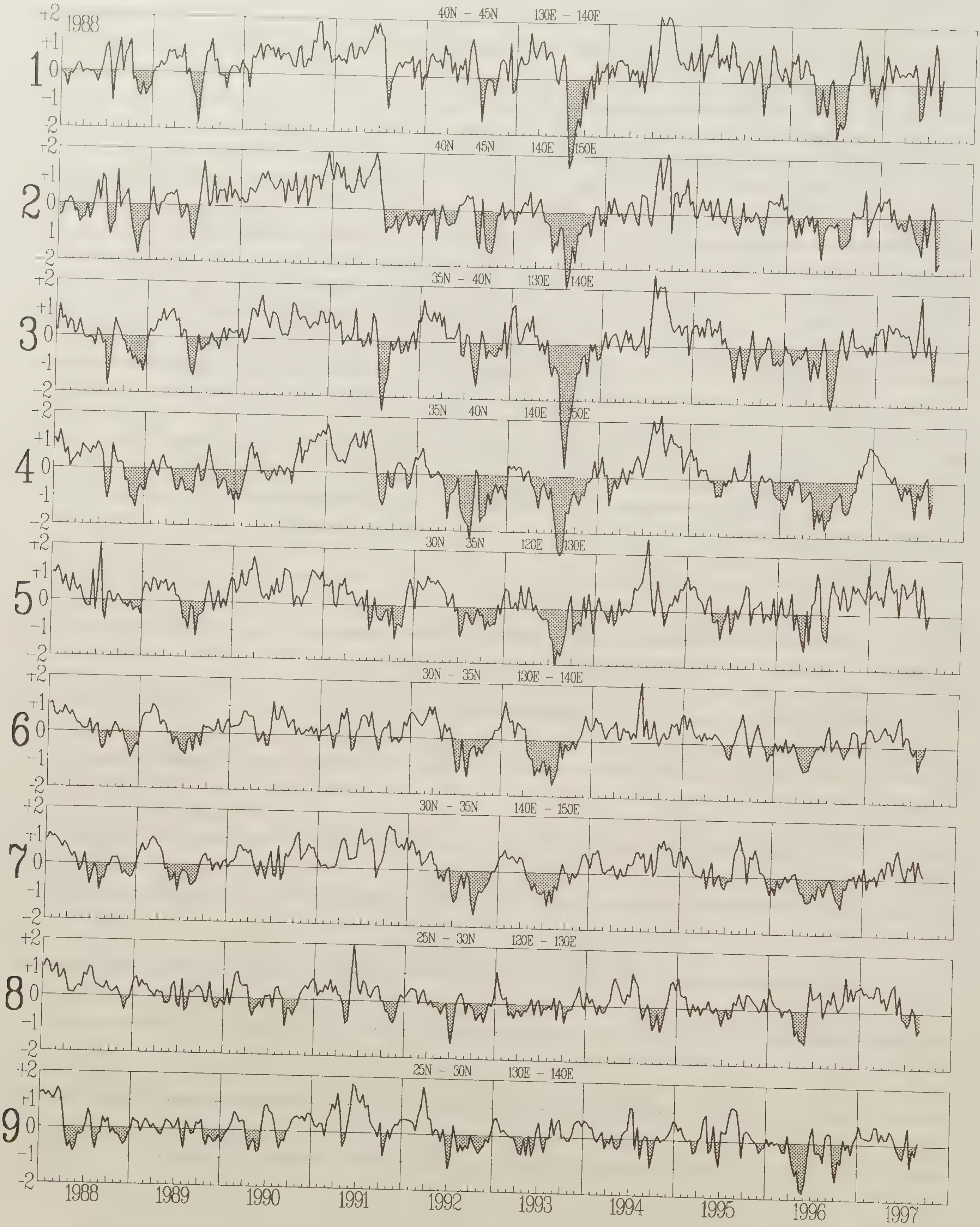
Fig.10 Sea surface dynamic heights (10cm) in the western North Pacific derived from the altimeter data of TOPEX/POSEIDON (AUG 27, 1997).
1500db surface is assumed to be the surface of no motion.

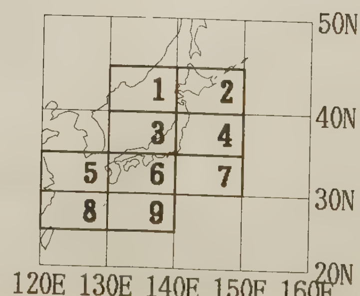


第11図 北西太平洋海流ベクトル図(1997年 8月27日)

Fig.11 Sea surface current vectors in the western North Pacific (AUG 27, 1997).
Vectors are derived from the sea surface dynamic heights from TOPEX/POSEIDON and subsurface temperature distribution assuming the geostrophic relation.

Time Series of Area Mean SST in the Western North Pacific

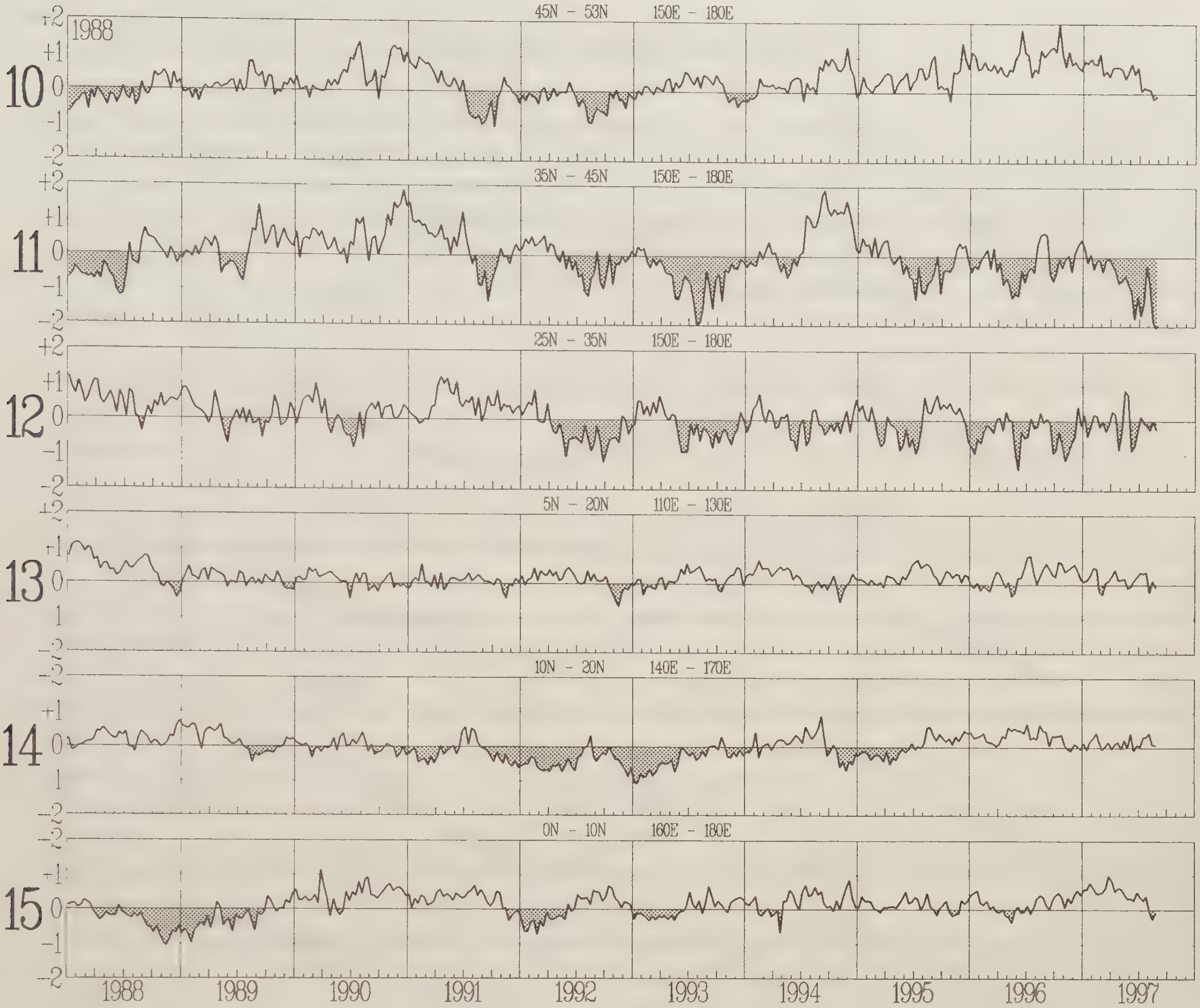




第12図　海域別旬平均海面水温平年偏差時系列図

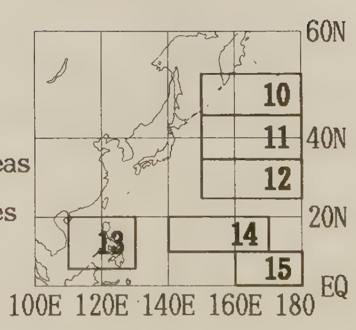
Fig.12 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

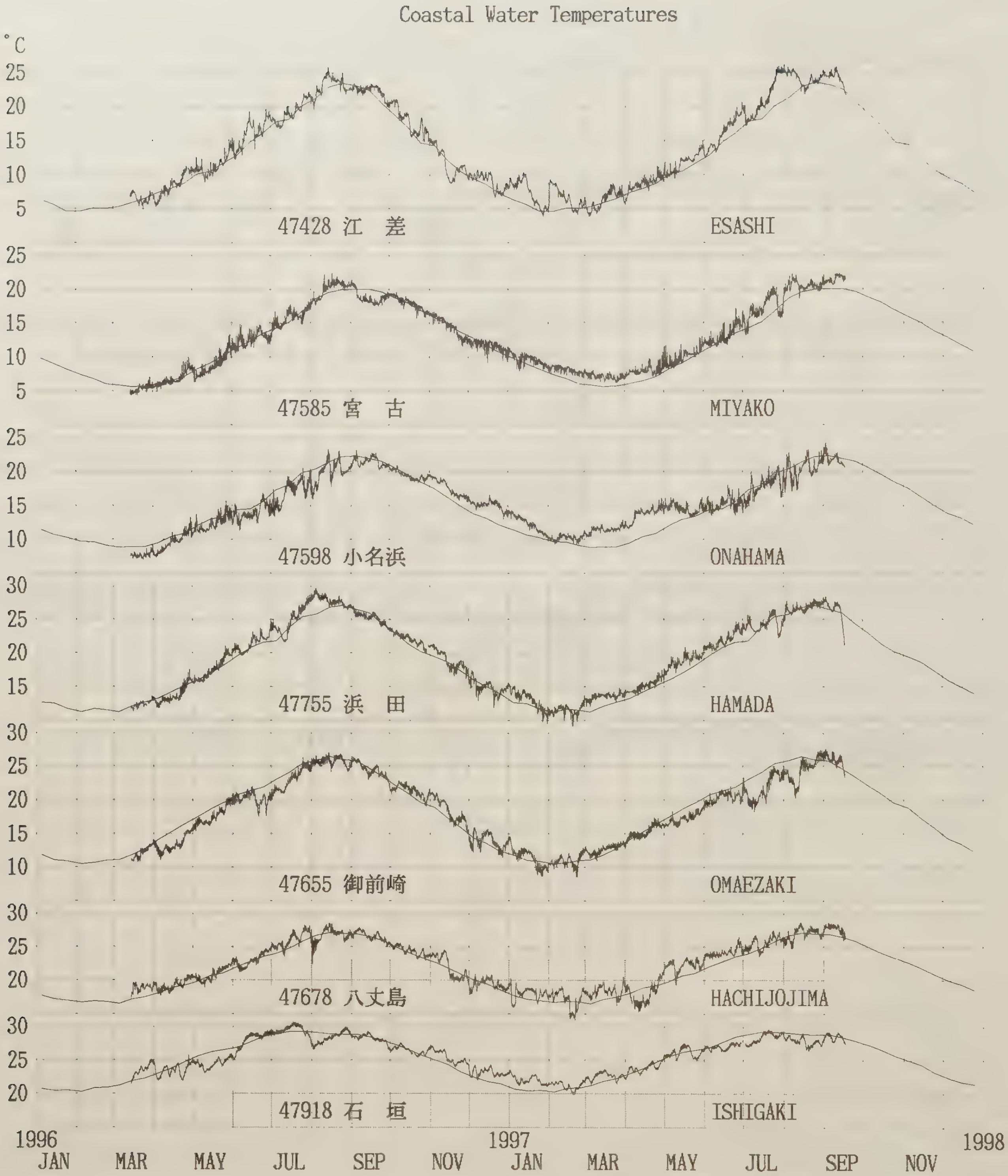
Time Series of Area Mean SST in the Western North Pacific



第12図　海域別旬平均海面水温平年偏差時系列図（つづき）

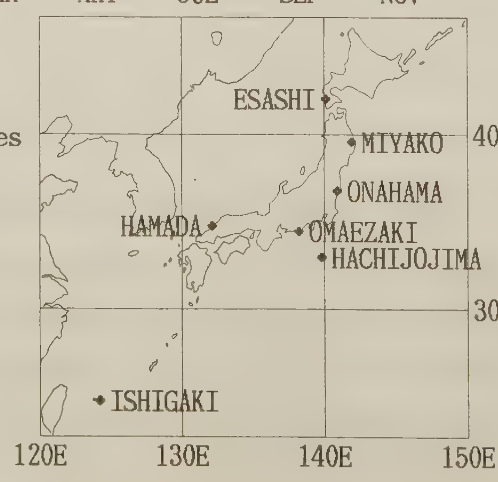
Fig.12 (continue) Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).



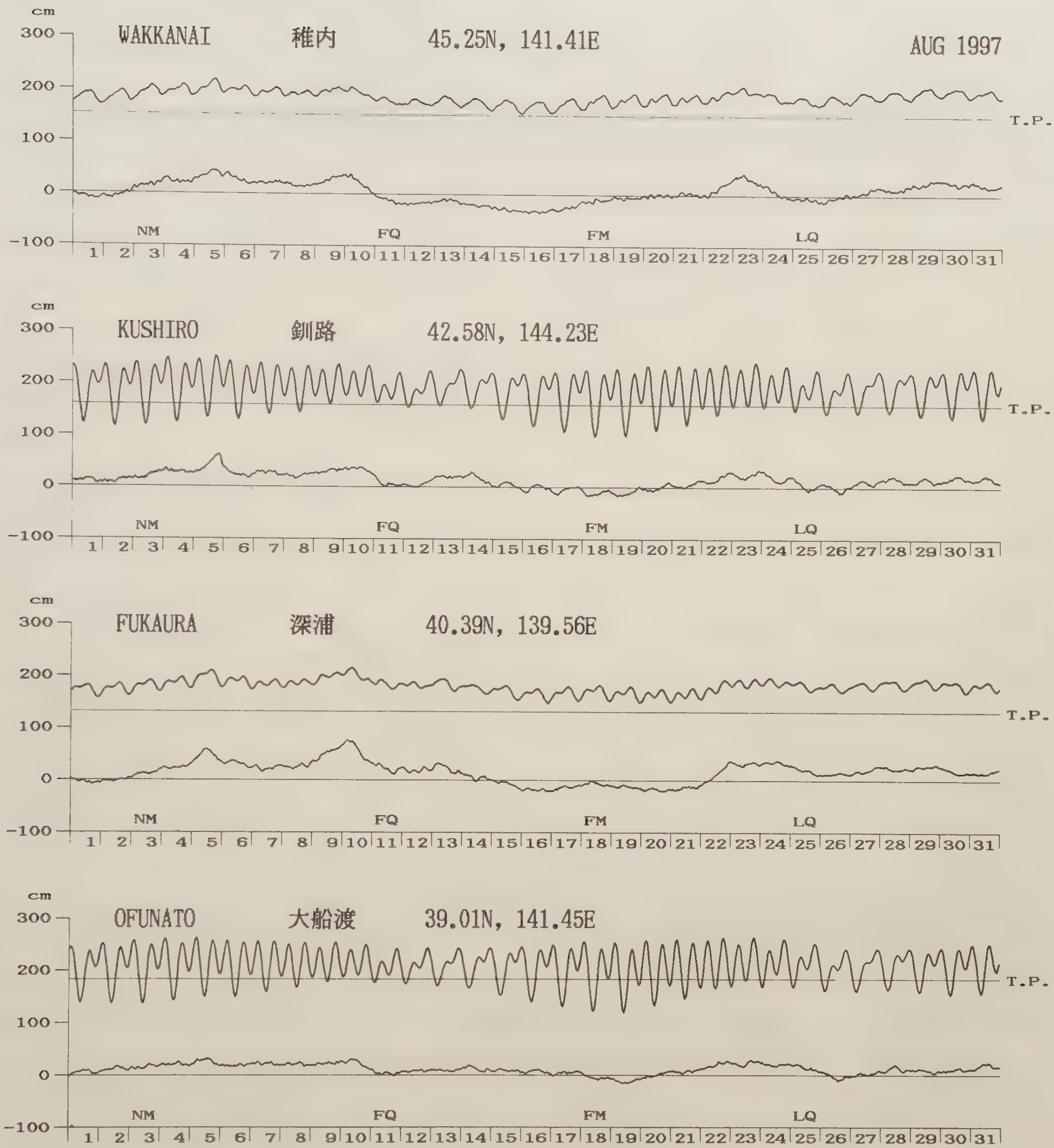


第13図 沿岸水温時系列図

Fig.13 Time series of hourly coastal water temperatures (˚C) measured at 7 coastal stations of the JMA shown in the right panel.
Thin lines show ten-day mean climatology.

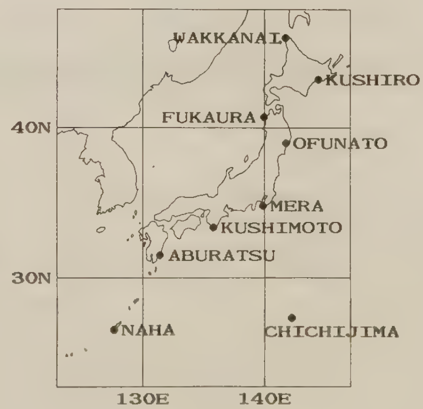


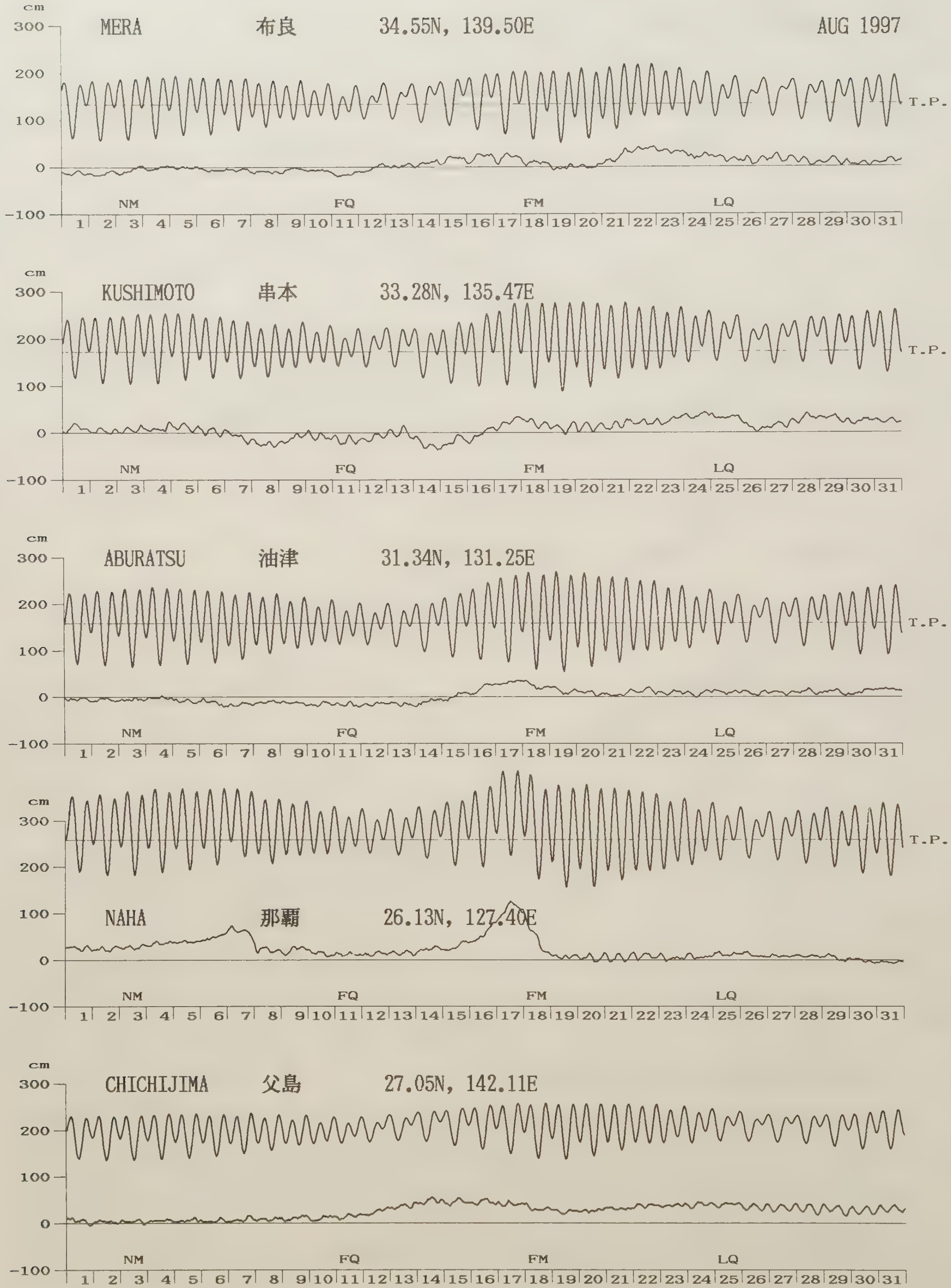
Time Series of Sea Level



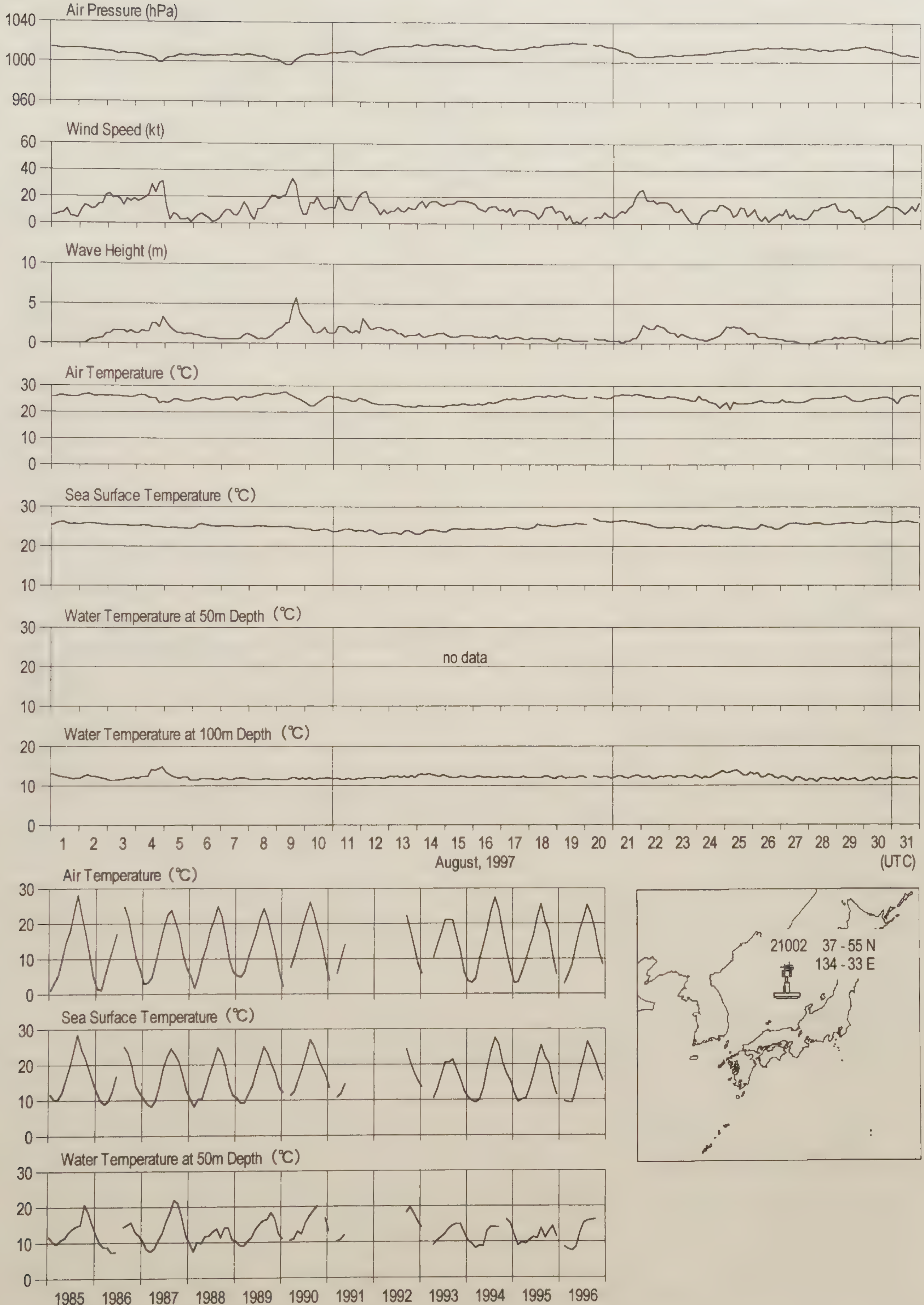
第14図 沿岸潮位時系列図 (1997年 8月)

Fig.14 Time series of hourly sea level observation (upper line) and its anomalies (lower line) at 9 stations of the JMA in the right panel.
Short term variations are removed from raw data.
Sea level anomalies are two times values of the differences between the observations and the predicted astronominal tide.
FM: full moon, FQ: first quarter
NM: new moon, LQ: last quarter
T.P.: Mean sea level of Tokyo Bay (Tokyo Peil)



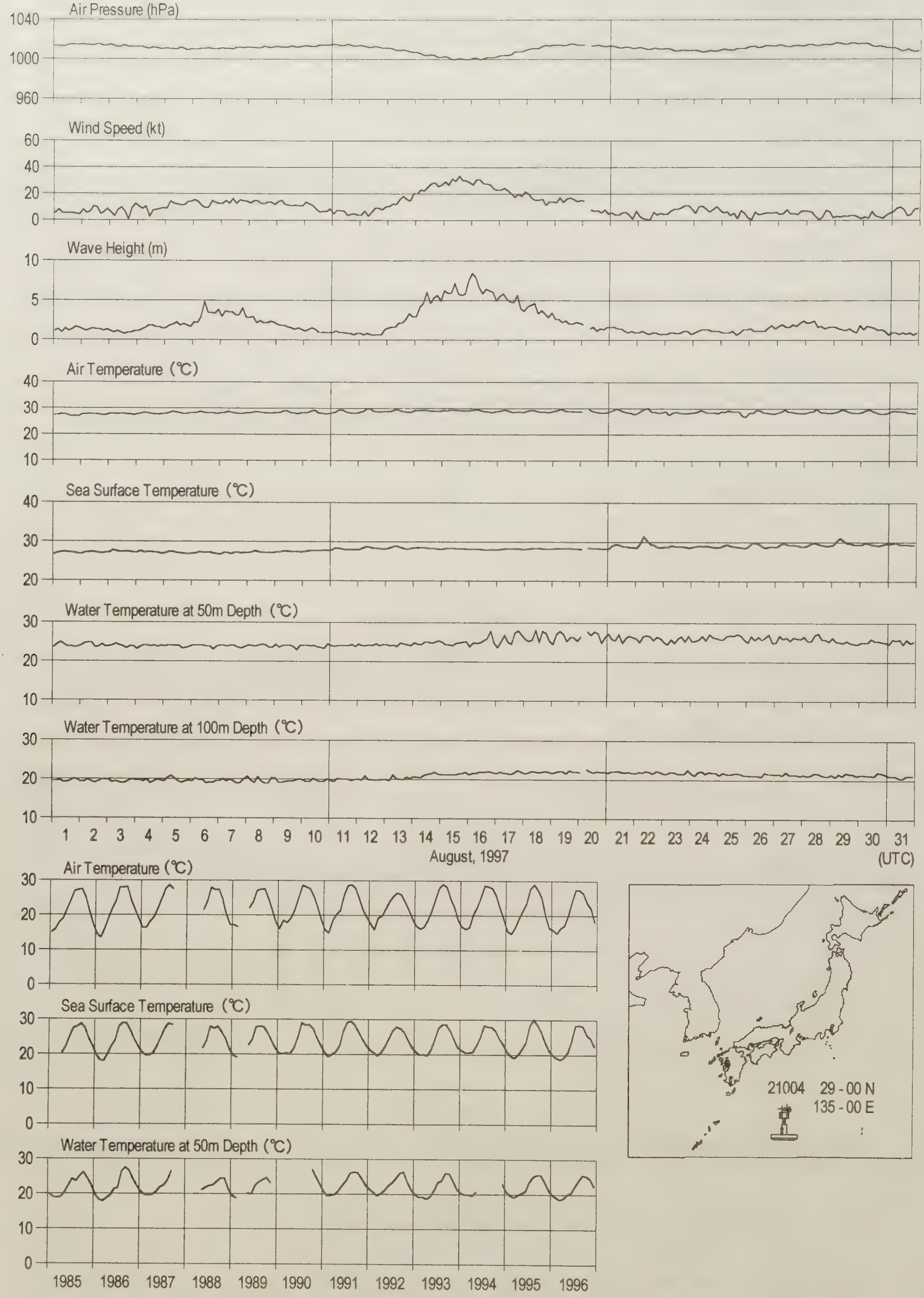


第14図 つづき
Fig.14 continue



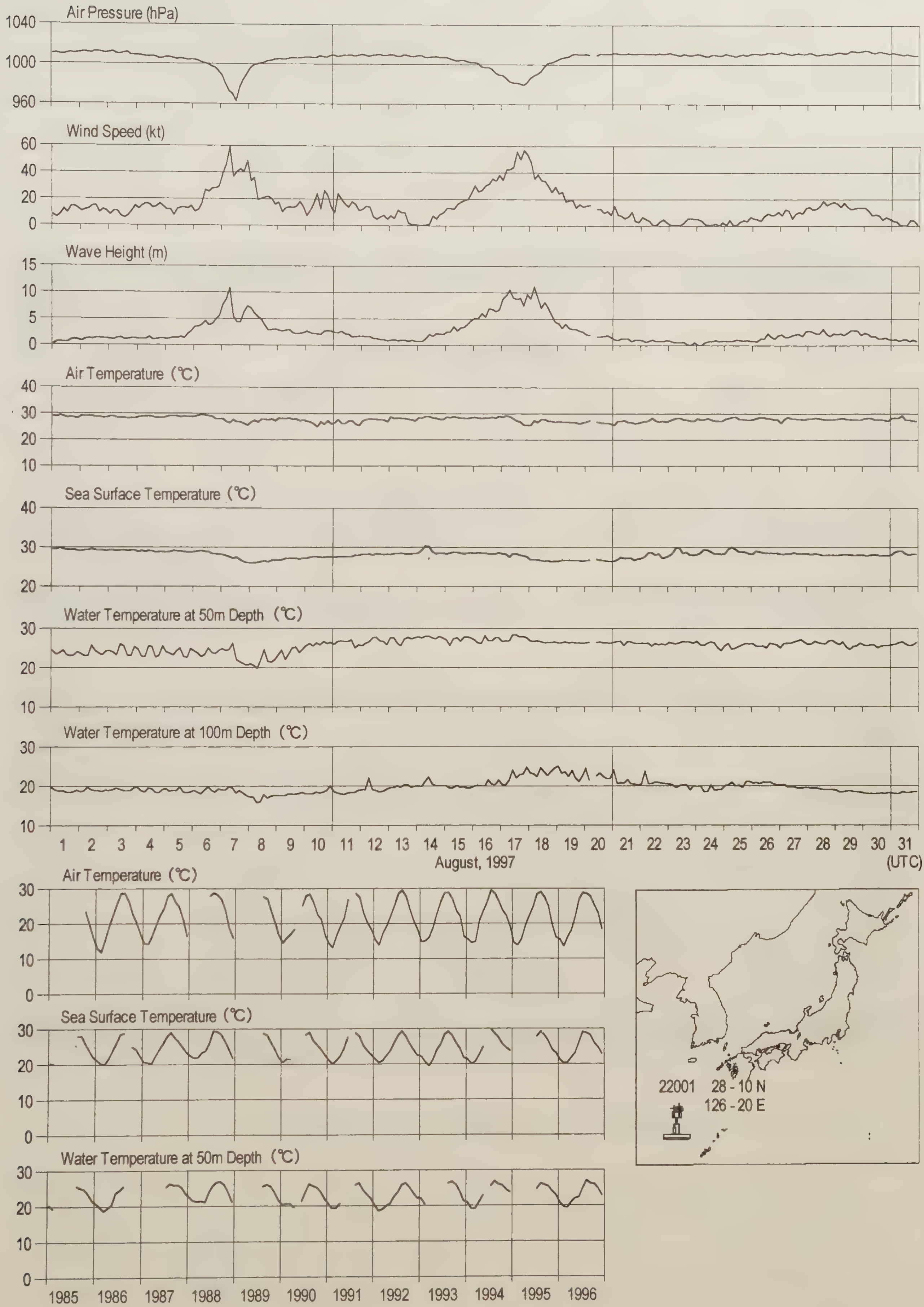
第15図　海洋気象ブイロボットによる観測要素の時系列図（日本海：21002）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation in the Japan Sea (WMO ID No. 21002).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



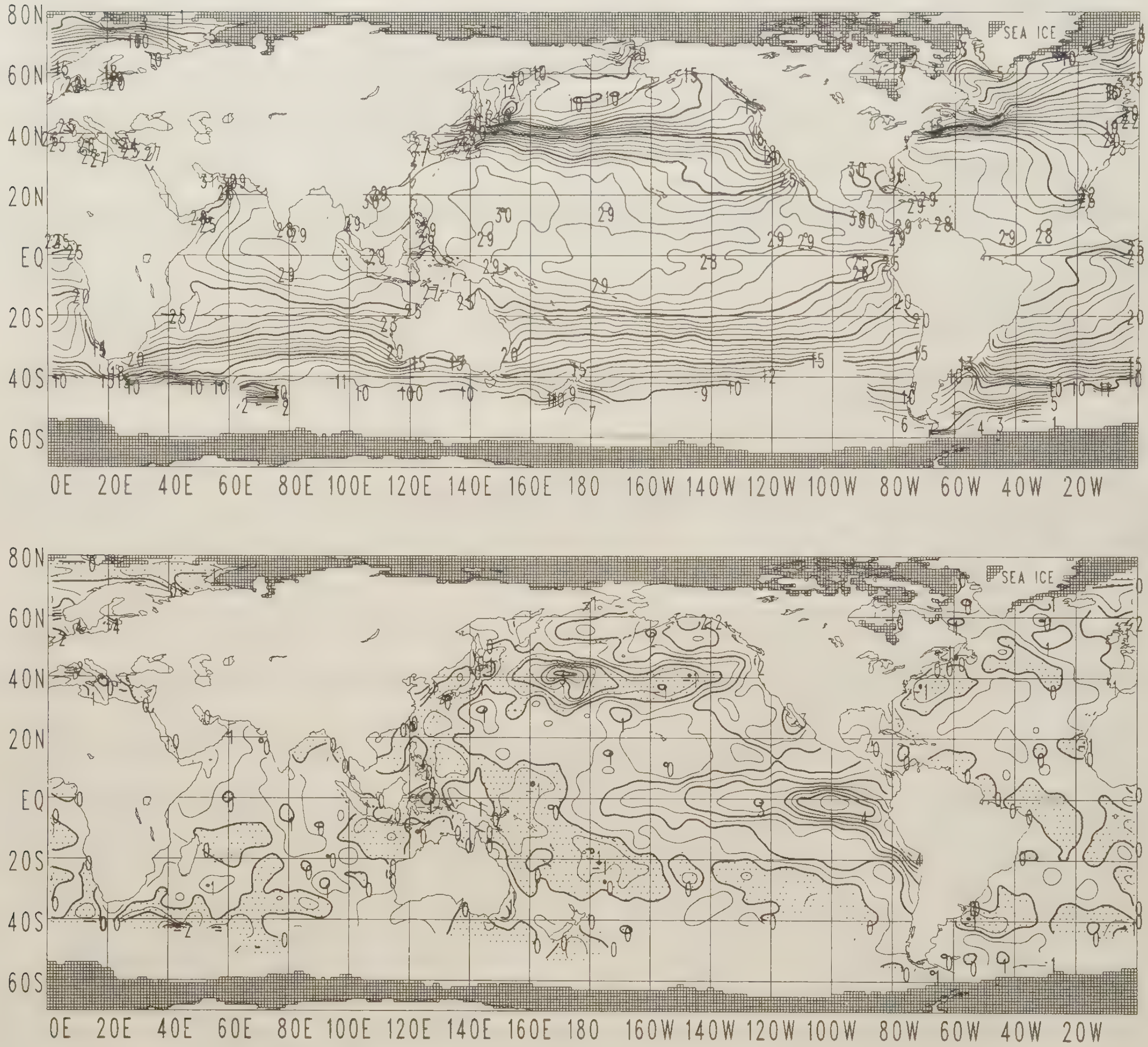
第15図　海洋気象ブイロボットによる観測要素の時系列図（四国沖：21004）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation south of Shikoku (WMO ID No. 21004). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



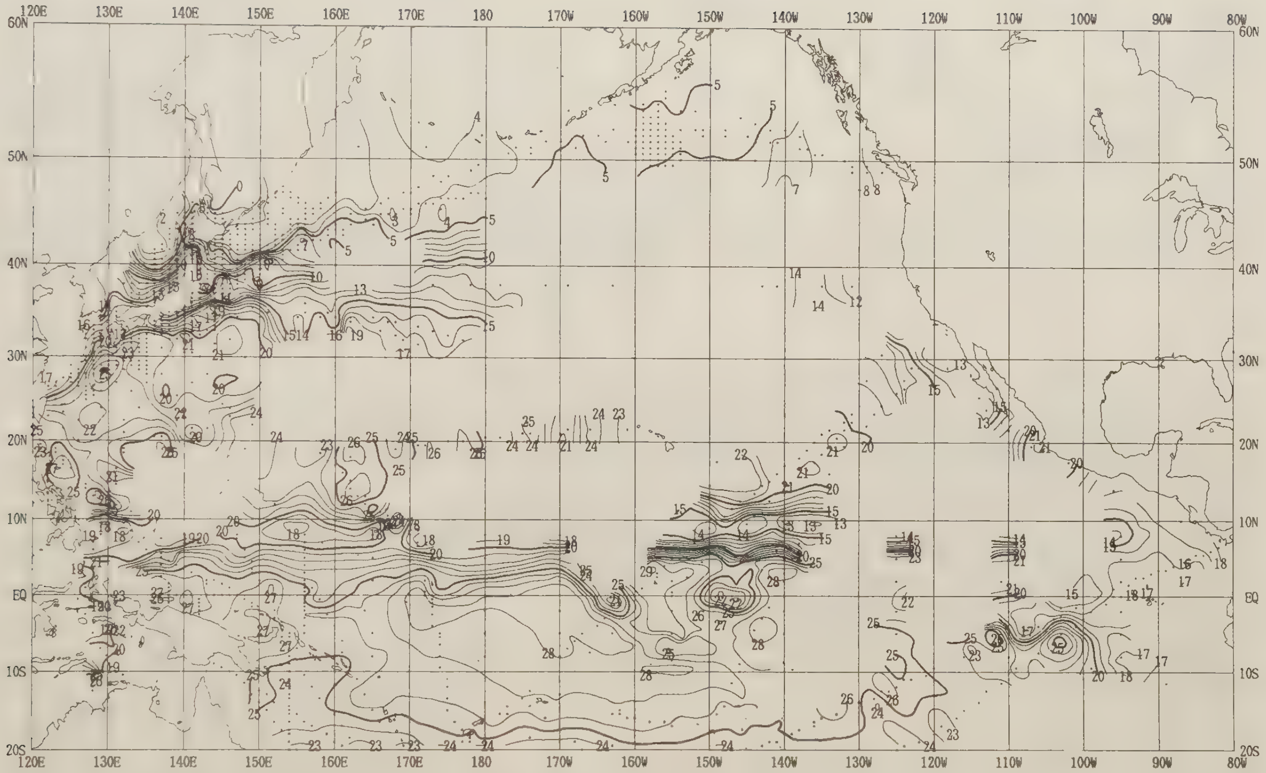
第15図　海洋気象ブイロボットによる観測要素の時系列図（東シナ海：22001）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation in the East China Sea (WMO ID No. 22001). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



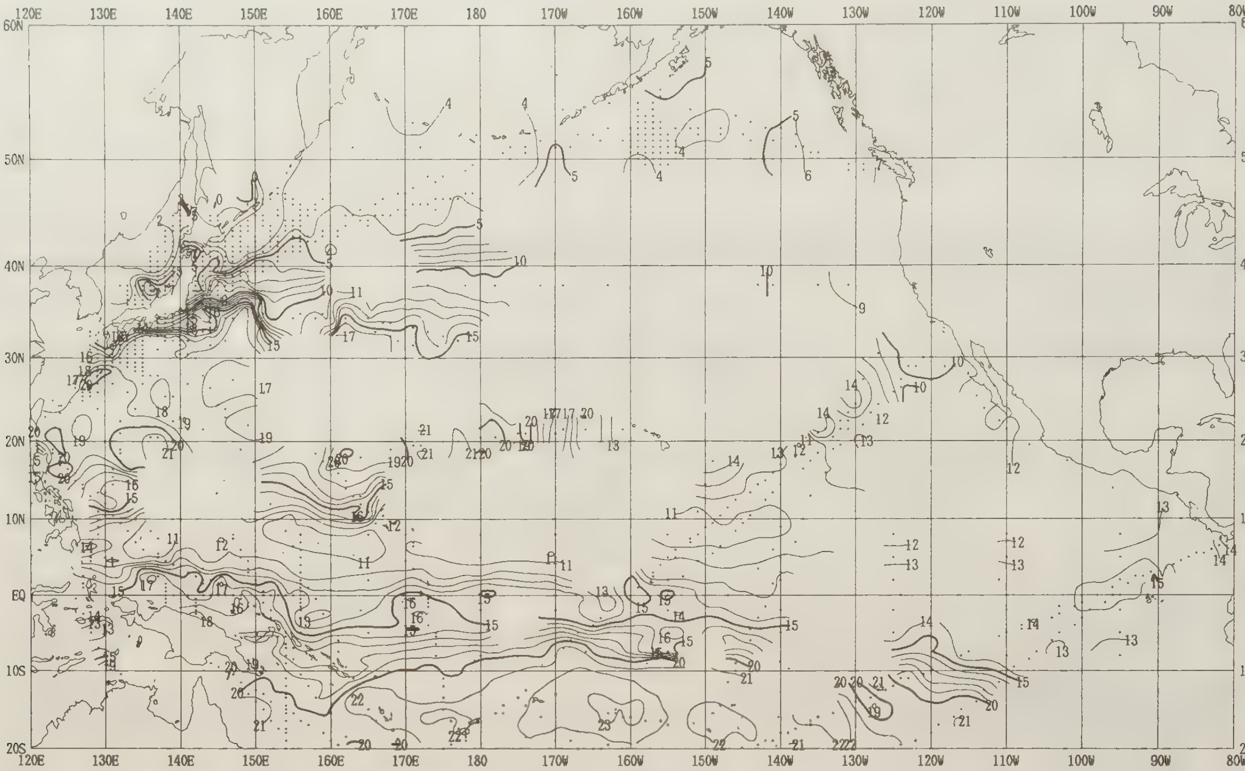
第16図　全球月平均海面水温図（上）及び偏差図（下）（1997年 8月）

Fig.16 Monthly mean sea surface temperature over the global ocean (top) and anomalies (bottom) for AUG 1997. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C (top) and additional anomaly contours of ±0.5°C are shown by thin lines. Negative anomalies are spotted. Maximum coverage of sea ice is shaded. Data sources for sea ice are U.S. National Ice Center (polar regions) and JMA (the Sea of Okhotsk).



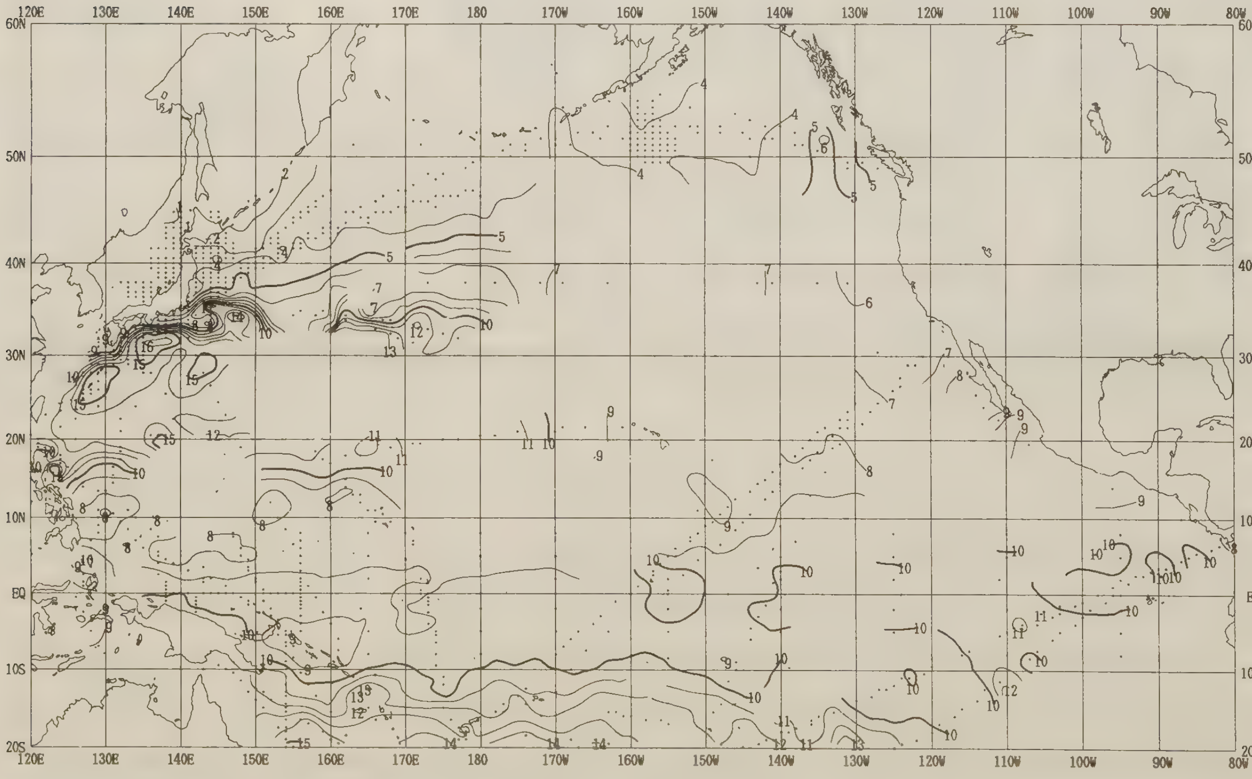
第17図　太平洋表層水温図(深さ100m) (1997年 8月)

Fig.17 Subsurface (100m) temperatures in the Pacific Ocean for AUG 1997. Contour interval is 1°C. Observation points are denoted by dots.



第18図　太平洋表層水温図(深さ200m) (1997年 8月)

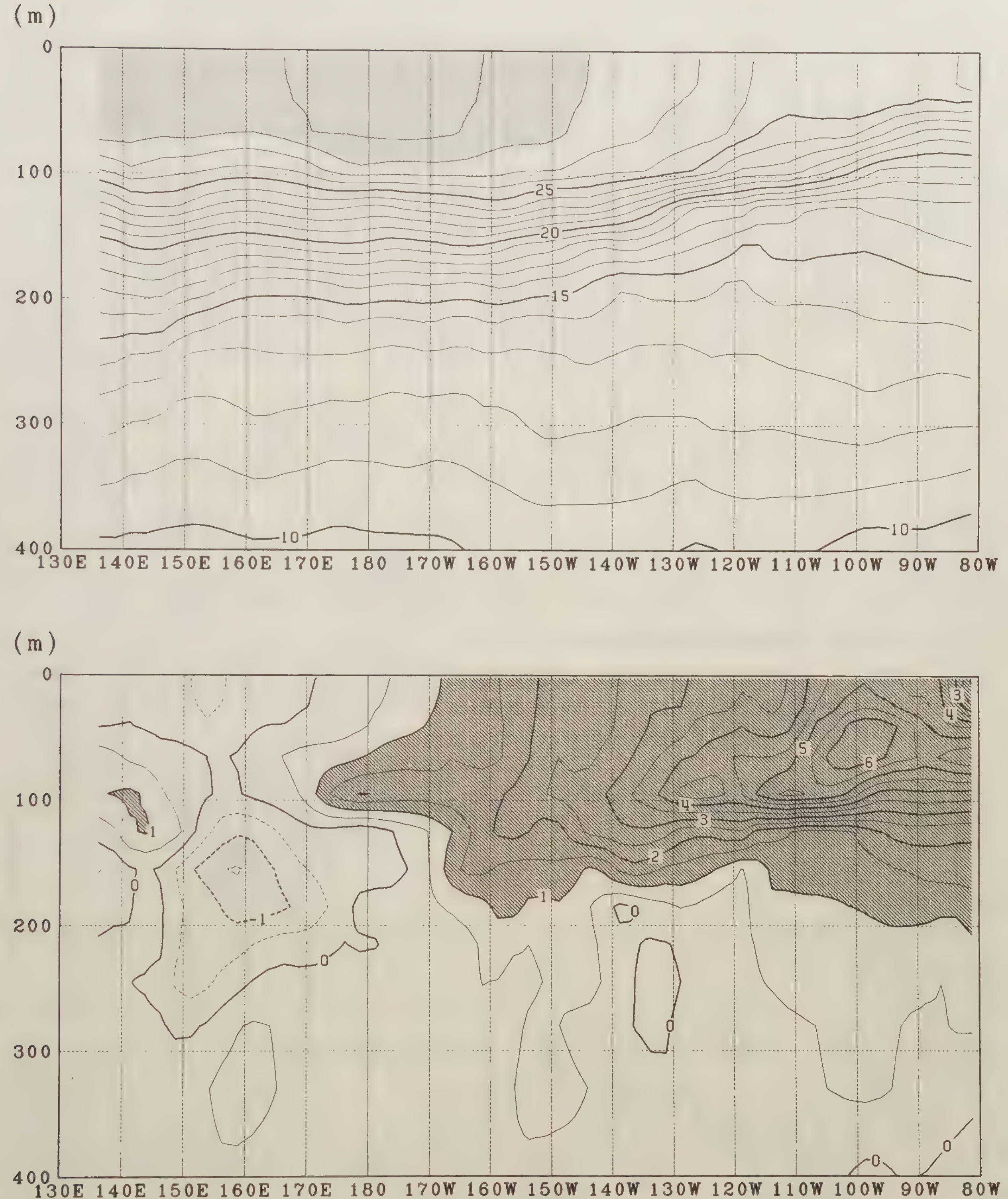
Fig.18 Subsurface (200m) temperatures in the Pacific Ocean for AUG 1997.
Contour interval is 1°C. Observation points are denoted by dots.



第19図　太平洋表層水温図(深さ400m) (1997年 8月)

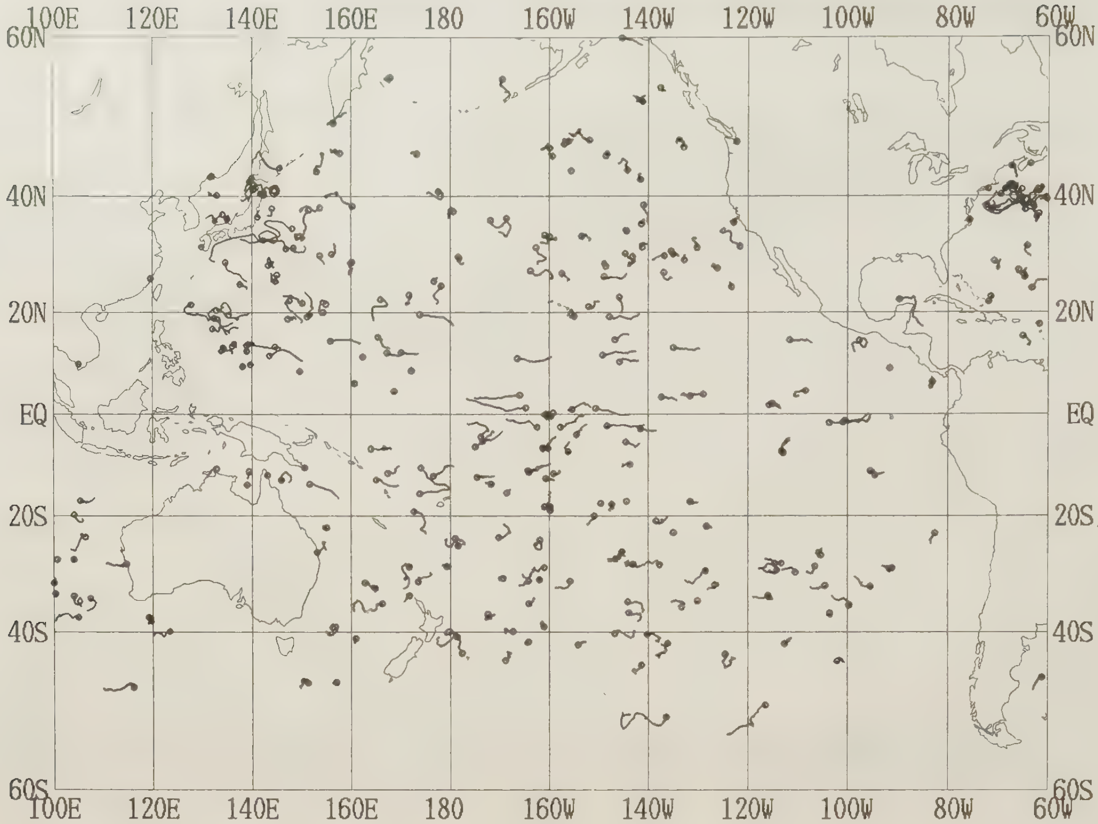
Fig.19 Subsurface (400m) temperatures in the Pacific Ocean for AUG 1997.
Contour interval is 1°C. Observation points are denoted by dots.

Depth-Longitude Sections of Equatorial Temperature & Anomalies



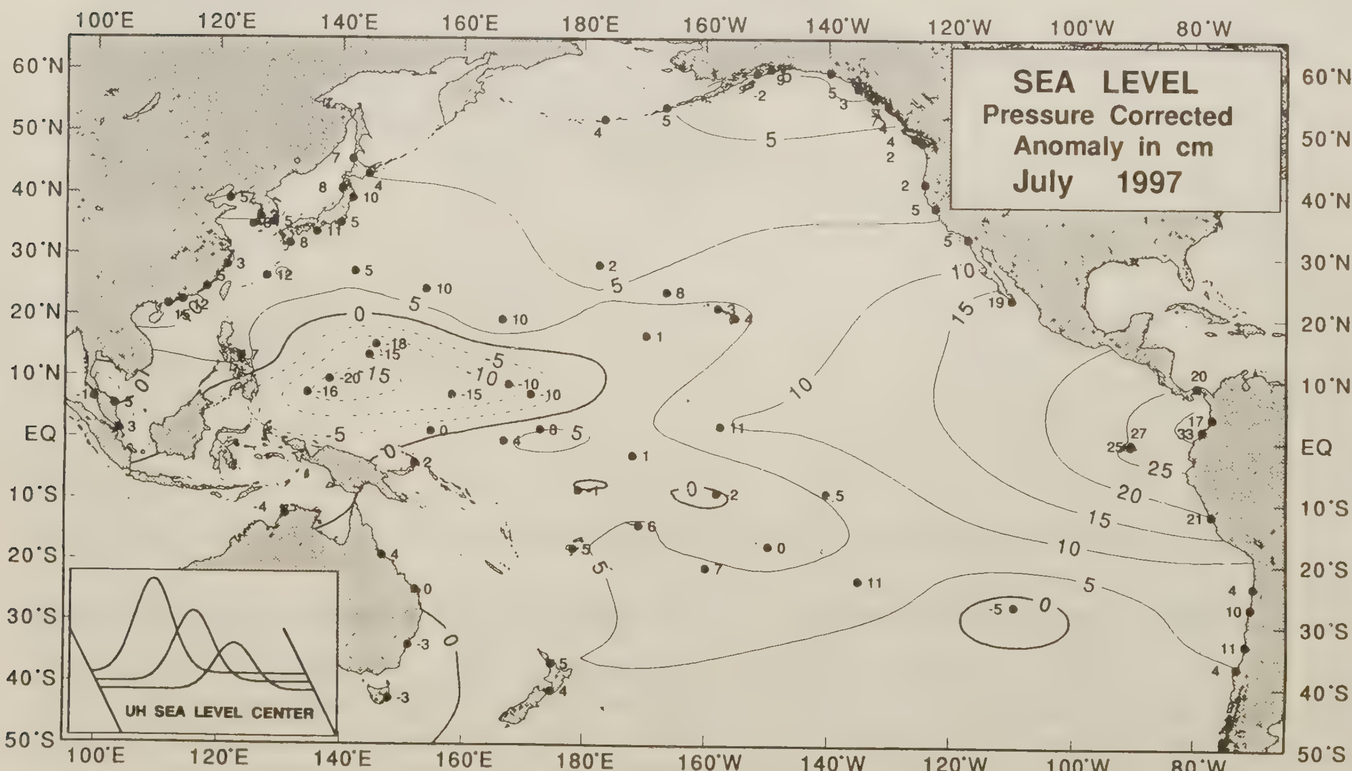
第20図　太平洋赤道に沿う表層水温（上）及び偏差（下）の深度－経度断面図（1997年 8月）

Fig.20 Depth-longitude sections of temperature (top) and anomalies (bottom) along the equator in the Pacific Ocean for AUG 1997. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (top) and 0.5°C (bottom). Values greater than 28°C in the top panel are shaded. In the bottom panel, values greater than 1°C are shaded and values less than -1°C are spotted. Anomalies are computed from 1987-1995 base period means.



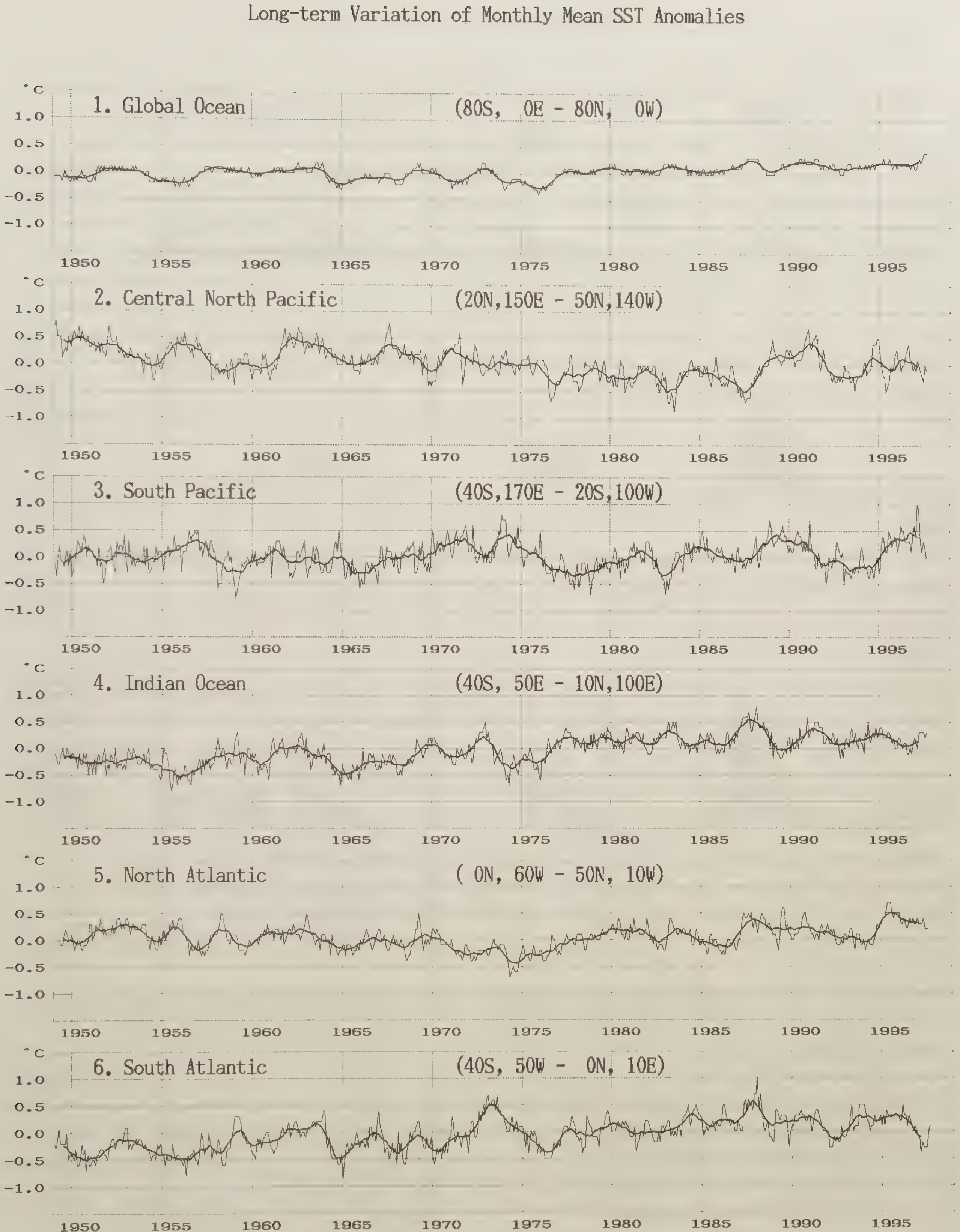
第21図　太平洋ブイ流跡図(1997年 8月)

Fig.21 Movements of drifting buoys in the Pacific Ocean during AUG 1997. Each track is for one buoy. Small circles represent last positions for the month.



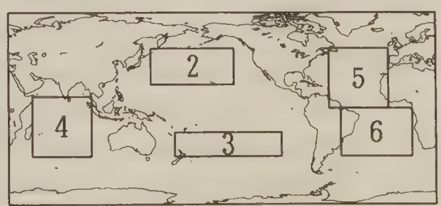
第22図　太平洋海面水位偏差図 (1997年 7月)

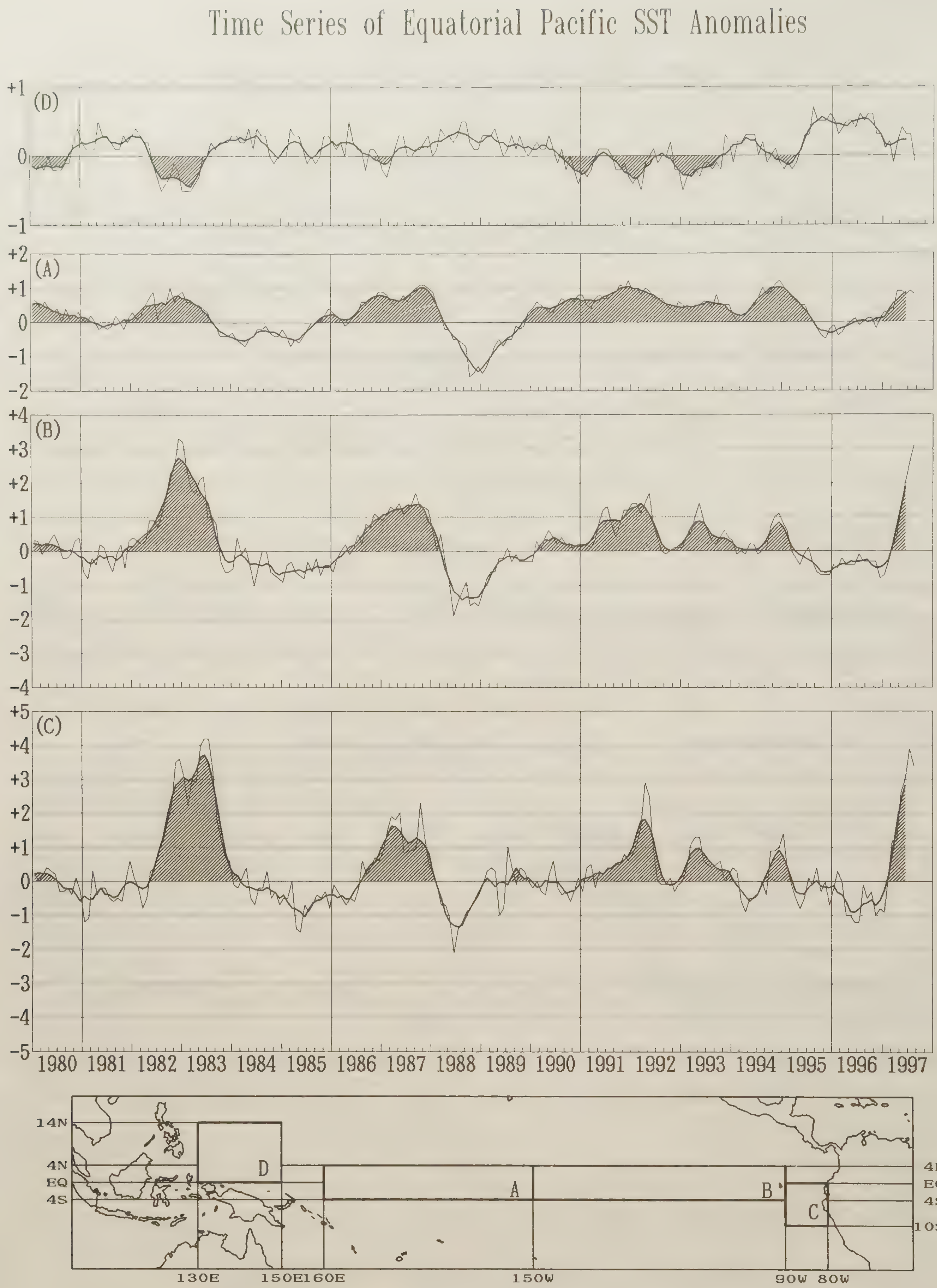
Fig.22 Monthly sea level anomalies for JUL 1997 obtained from mean sea level (1975-1995) adjusted for atmospheric pressure. This figure is prepared by the SOC of ISLP-PAC, Dept. of Oceanography, Univ. of Hawaii.



第23図 海域平均海面水温偏差の長期変動

Fig.23 Long-term variations of monthly mean sea surface temperature anomalies (°C) for the areas shown in the right panel. Anomalies are computed from the JMA climatology (1961-90). Thin lines show the monthly mean and thick lines their 13-month running means.





第24図　太平洋赤道域の海面水温偏差時系列図

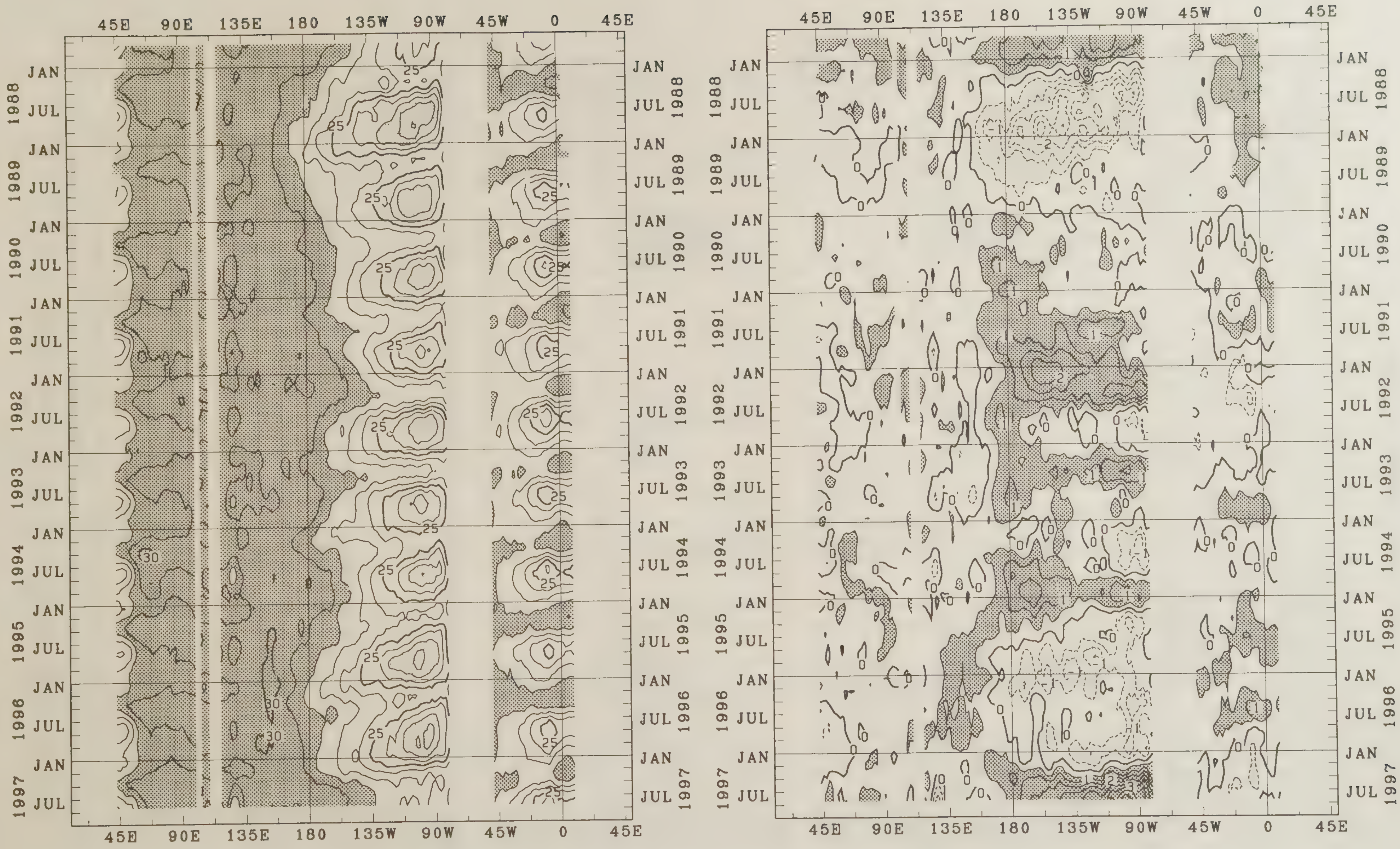
Fig.24 Time series of monthly mean SST anomalies (°C) in the equatorial Pacific Ocean for the areas indicated at the bottom panel. Thin lines show the monthly means and thick lines their 5-month running means. Positive anomalies (A, B, C) and negative anomalies (D) are shaded. Anomalies are computed from the JMA climatology (1961-1990).

El Nino Monitoring Indices

	SEA SURFACE TEMPERATURE AND ANOMALY (°C)								SOI	SEA LEVEL PRESSURE ANOMALY (hPa)	
MONTH	REGION D 14N-EQ 130E-150E		REGION A 4N-4S 160E-150W		REGION B 4N-4S 150W-90W		REGION C EQ-10S 90W-80W		SOI	TAHITI 17-33S 149-37W	DARWIN 12-24S 130-52E
JAN 95	28.3	-0.2	29.0	1.0	26.2	0.8	25.7	1.4	-0.4	-0.3	0.6
FEB 95	28.2	-0.1	28.9	0.9	26.8	0.6	26.1	0.4	-0.2	0.6	1.1
MAR 95	28.2	-0.2	28.8	0.7	26.9	0.0	25.8	-0.1	0.4	0.3	-0.5
APR 95	28.7	-0.1	28.8	0.6	26.9	-0.2	24.6	-0.5	-1.4	-1.6	-0.0
MAY 95	29.2	0.1	29.0	0.5	26.2	-0.4	23.1	-0.8	-1.0	-0.7	0.6
JUN 95	29.6	0.3	29.0	0.5	26.0	-0.1	22.2	-0.5	-0.1	0.3	0.4
JUL 95	29.5	0.3	28.7	0.2	25.3	0.1	21.7	0.1	0.4	0.4	-0.4
AUG 95	29.8	0.7	28.4	0.0	24.3	-0.3	20.5	-0.1	0.0	0.4	0.3
SEP 95	29.7	0.5	28.1	-0.2	24.0	-0.6	20.7	0.4	0.2	0.4	-0.0
OCT 95	29.8	0.5	28.0	-0.4	23.9	-0.7	20.4	-0.3	-0.3	-0.7	-0.5
NOV 95	29.7	0.5	27.9	-0.5	23.9	-0.7	21.5	0.0	0.1	0.1	-0.1
DEC 95	29.5	0.6	28.0	-0.2	24.2	-0.7	21.9	-0.7	-0.5	-0.9	0.0
JAN 96	29.0	0.5	27.9	-0.1	25.0	-0.4	24.1	-0.2	0.8	1.0	-0.7
FEB 96	28.6	0.3	27.6	-0.4	25.7	-0.5	26.0	0.3	0.1	-0.2	-0.5
MAR 96	28.8	0.4	27.8	-0.3	26.7	-0.2	25.9	0.0	0.7	1.0	-0.3
APR 96	29.3	0.5	28.1	-0.1	26.7	-0.4	24.1	-1.0	0.8	0.5	-0.5
MAY 96	29.6	0.5	28.5	0.0	26.2	-0.4	22.9	-1.0	0.3	1.2	1.2
JUN 96	29.7	0.4	28.6	0.1	25.7	-0.4	21.5	-1.2	1.4	1.6	-0.2
JUL 96	29.8	0.6	28.4	-0.1	25.1	-0.1	20.4	-1.2	0.7	0.6	-0.6
AUG 96	29.6	0.5	28.4	0.0	24.3	-0.3	20.5	-0.1	0.4	0.4	-0.3
SEP 96	29.8	0.6	28.4	0.1	24.3	-0.3	19.8	-0.5	0.5	-0.7	-1.7
OCT 96	29.9	0.6	28.5	0.1	24.3	-0.3	20.4	-0.3	0.4	-0.1	-0.8
NOV 96	29.5	0.3	28.2	-0.2	24.3	-0.3	20.5	-1.0	-0.0	-0.5	-0.5
DEC 96	29.2	0.3	28.3	0.1	24.1	-0.8	21.8	-0.8	0.8	-0.3	-1.9
JAN 97	28.6	0.1	28.3	0.3	24.7	-0.7	23.4	-0.9	0.3	1.7	0.9
FEB 97	28.5	0.2	28.2	0.2	25.9	-0.3	25.9	0.2	1.2	1.0	-1.9
MAR 97	28.3	-0.1	28.4	0.3	27.0	0.1	27.1	1.2	-0.6	-0.5	0.9
APR 97	29.0	0.2	29.1	0.9	27.5	0.4	26.3	1.2	-1.1	0.4	2.3
MAY 97	29.5	0.4	29.4	0.9	27.9	1.3	26.5	2.6	-2.5	-2.1	0.9
JUN 97	29.6	0.3	29.3	0.8	28.1	2.0	25.7	3.0	-2.3	-0.8	2.1
JUL 97	29.5	0.3	29.4	0.9	27.8	2.6	25.5	3.9	-0.8	-0.1	1.2
AUG 97	29.0	-0.1	29.2	0.8	27.7	3.1	24.0	3.4	-2.0	-0.9	2.2

第1表　エルニーニョ監視指数

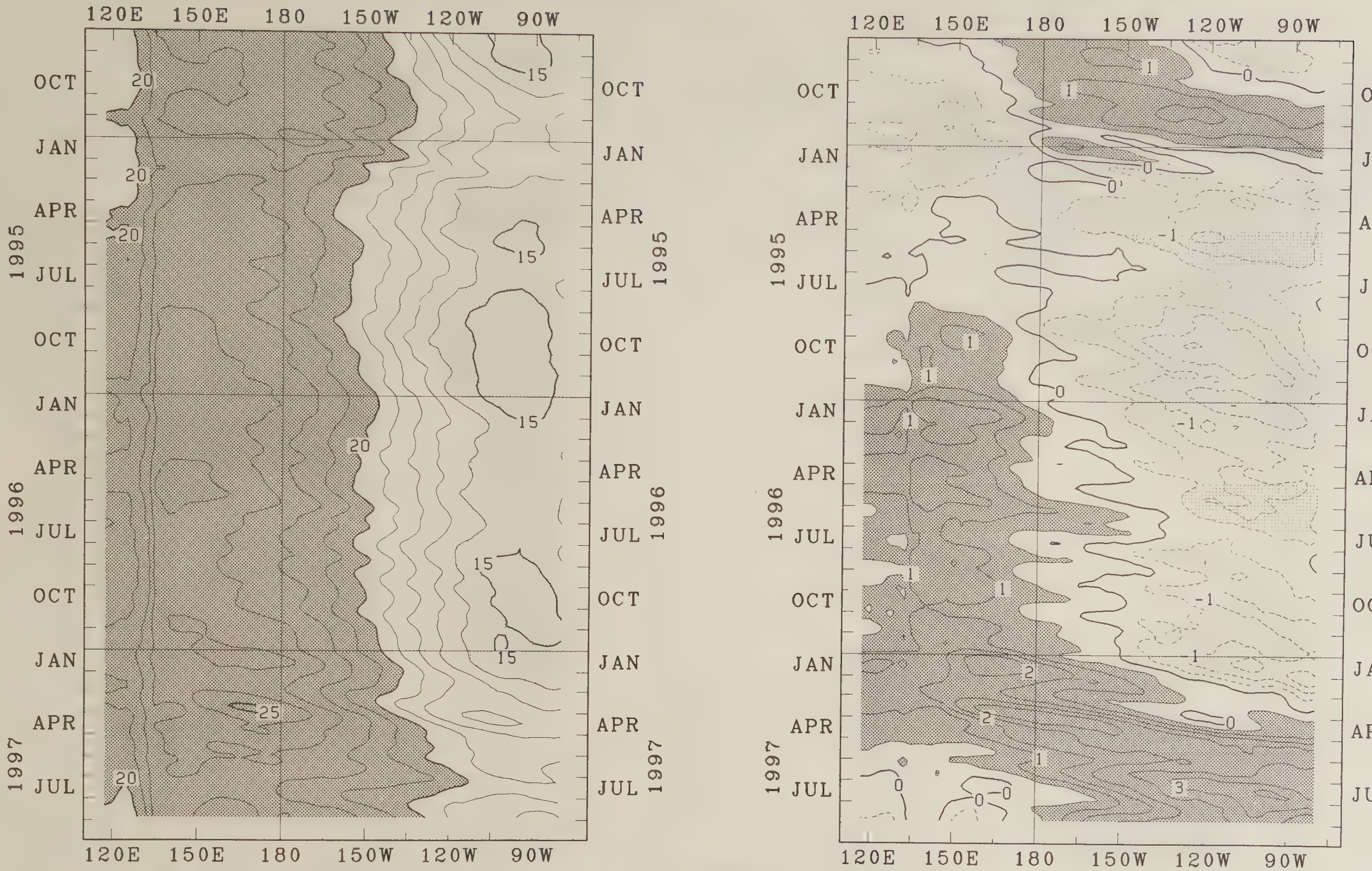
Table 1 El Nino Monitoring indices



第 25 図　赤道に沿った海面水温（左）および偏差（右）の時間-経度断面図

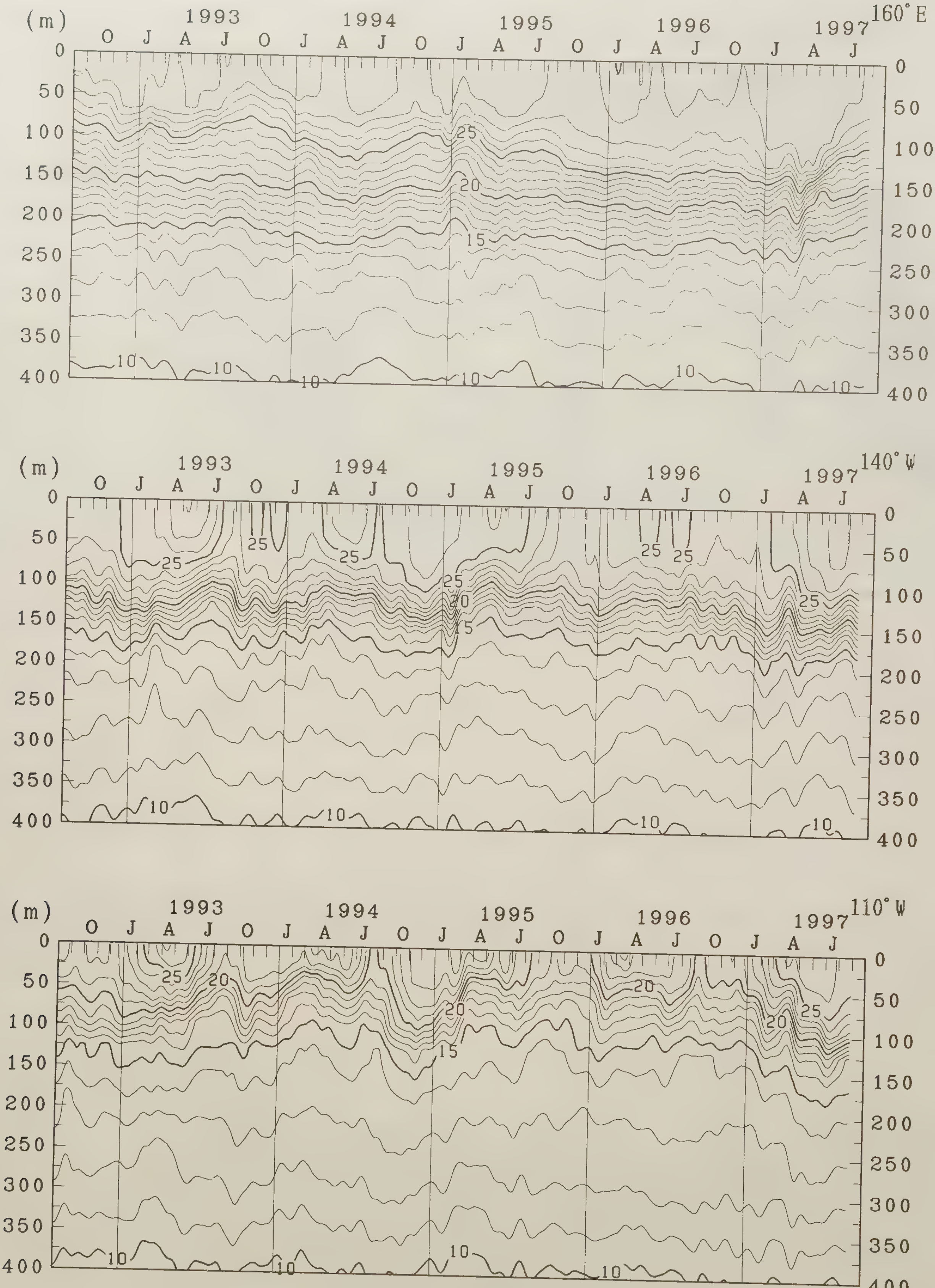
Fig.25 Time-longitude sections of SSTs (left) and anomalies (right) along the equator (2°N-2°S) in the global ocean. Contour interval is 1°C (left) and 0.5°C (right). Values greater than 28°C are shaded and values less than 23°C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1961-1990 base period means.

Time–Longitude Sections of Ocean Heat Content & Anomalies (Eq.)



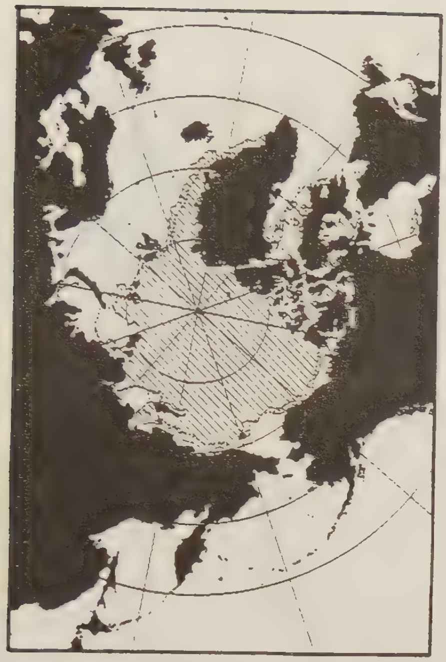
第26図　太平洋の赤道に沿う海洋表層の貯熱量（左）及び偏差（右）の時間－経度断面図

Fig.26 Time-longitude sections of ocean heat content in the upper 260m along the equator (left) and anomalies (right) in the Pacific Ocean. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (left) and 0.5°C (right). Values greater than 20°C are shaded and values less than 16°C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1987-1995 base period means.



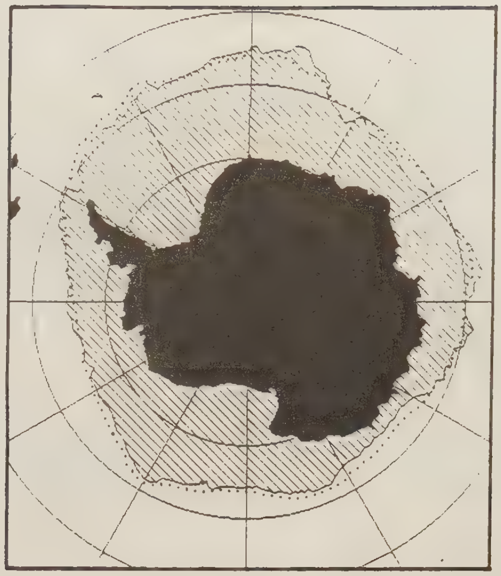
第27図　太平洋赤道域の表層水温の時間－深度断面図
（上：西部、中：中部、下：東部）

Fig.27 Time-depth sections of equatorial subsurface temperature for the western Pacific (top, 160°E), the central Pacific (middle, 140°W) and the eastern Pacific (bottom, 110°W). Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C. Values greater than 28°C are shaded.



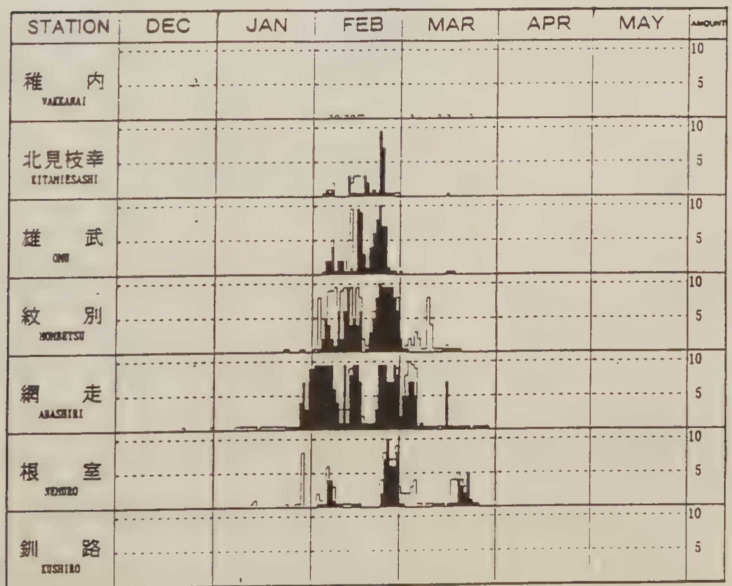
第28-1図　北極域の海氷図（1997年 8月15日）

Fig. 28-1　Sea ice chart in the Arctic on 15 AUG. 1997. The area hatched represents the sea ice extent.　The dotted line denotes the mean ice edge averaged for the period from 1972 through 1990.　The data source is the U.S. National Ice Center (USA).



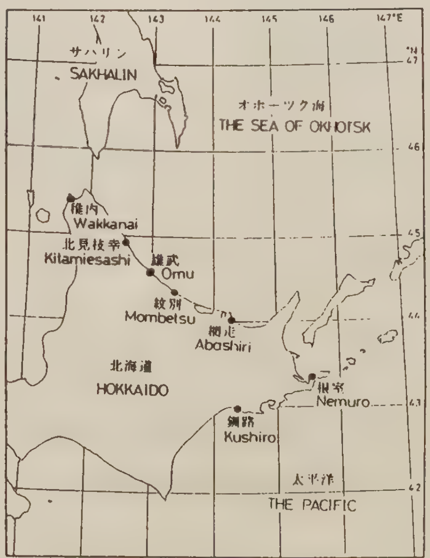
第28-2図　南極域の海氷図（1997年 8月15日）

Fig. 28-2　Sea ice chart in the Antarctic on 15 AUG. 1997. The area hatched represents the sea ice extent.　The dotted line denotes the mean ice edge averaged for the period from 1972 through 1990.　The data source is the U.S. National Ice Center (USA).



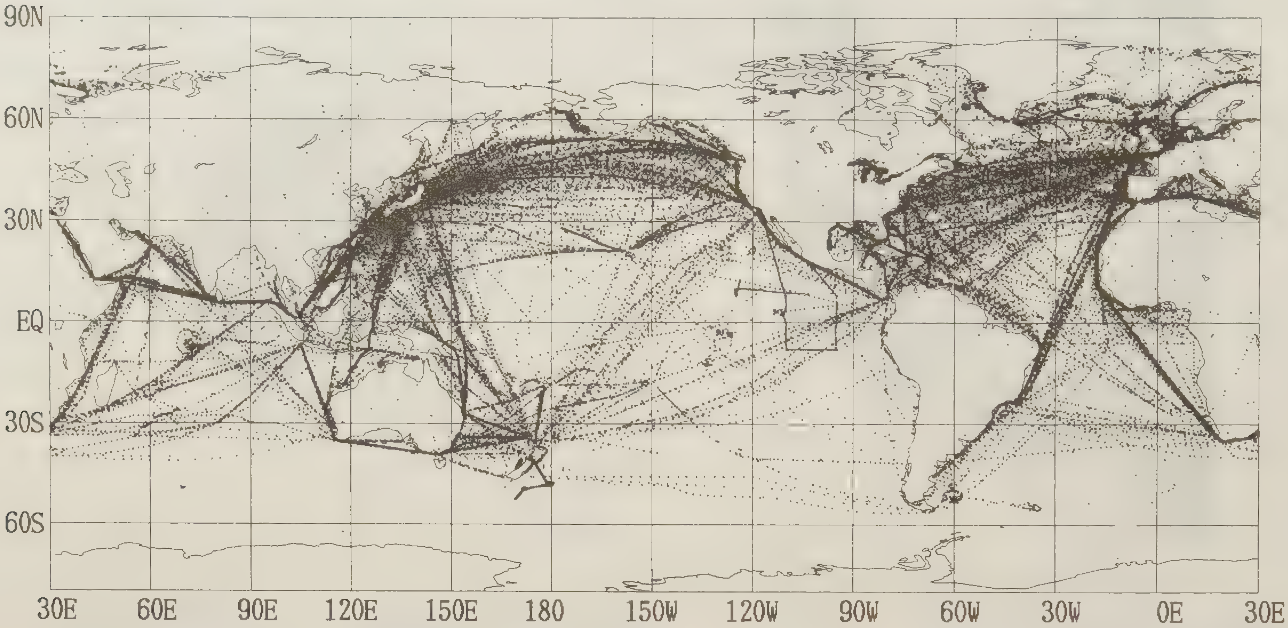
第28-3図　日々の全氷量と流氷量

Fig. 28-3　Time series of daily amount of sea ice (1996/97)
□ : total amount of sea ice
■ : total amount of drift ice

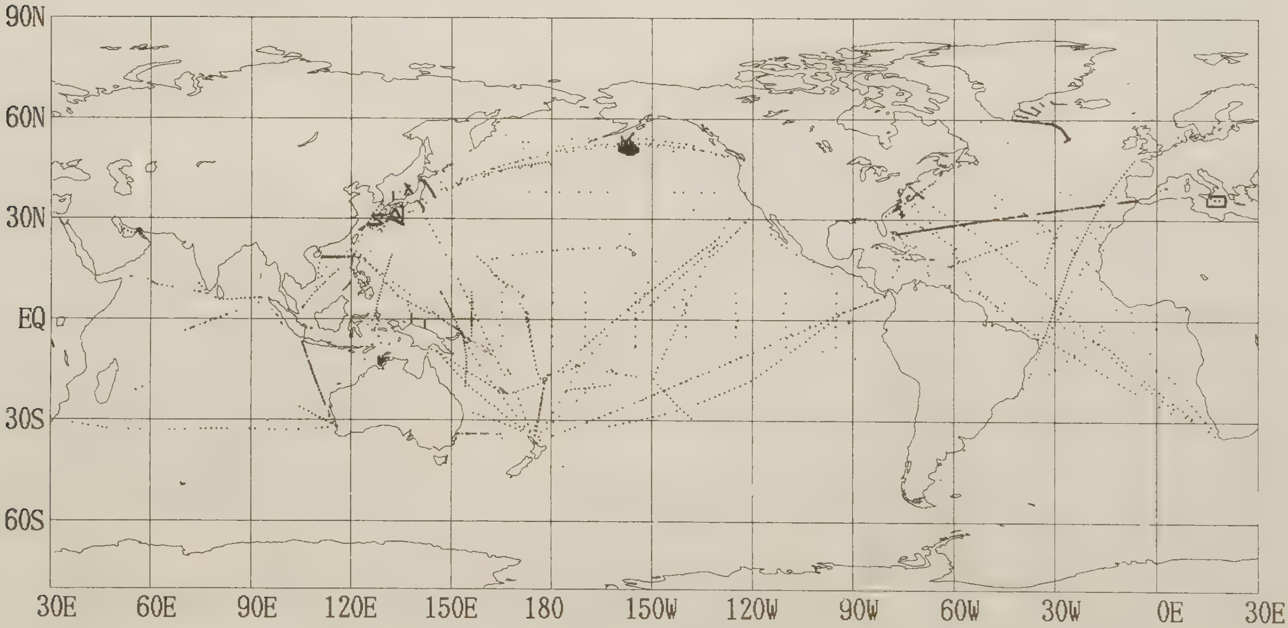


第28-4図　沿岸海氷観測地点地図

Fig. 28-4　Map of the coastal stations to observe sea ice



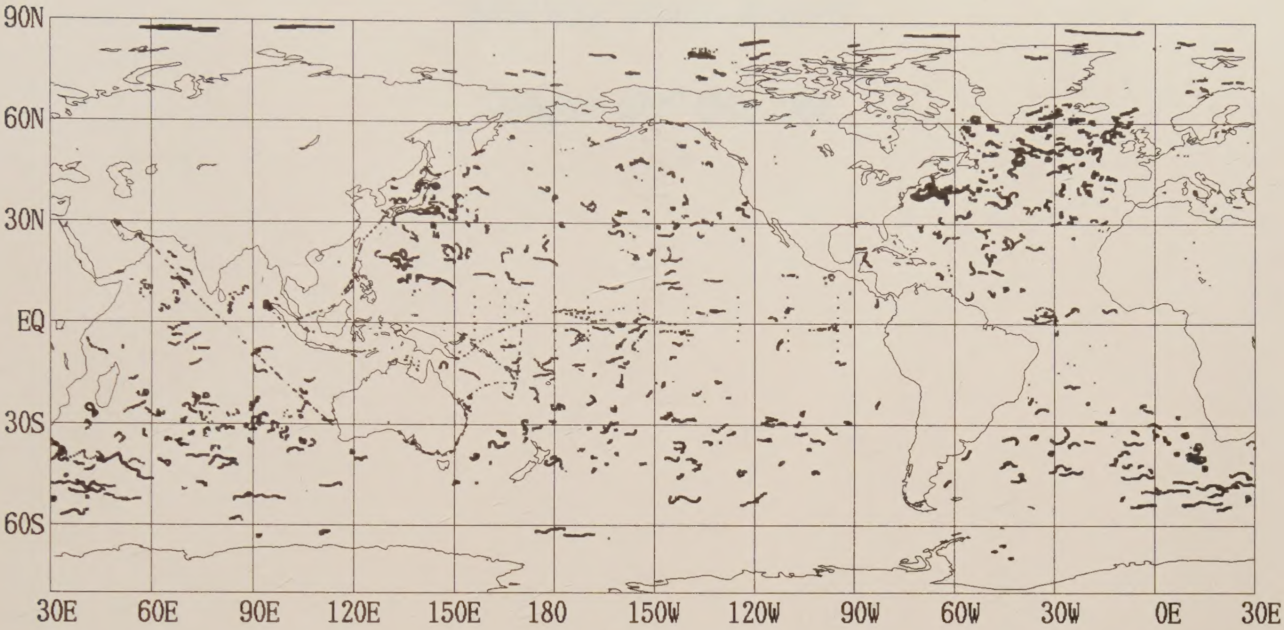
SHIP messages Total data:125967



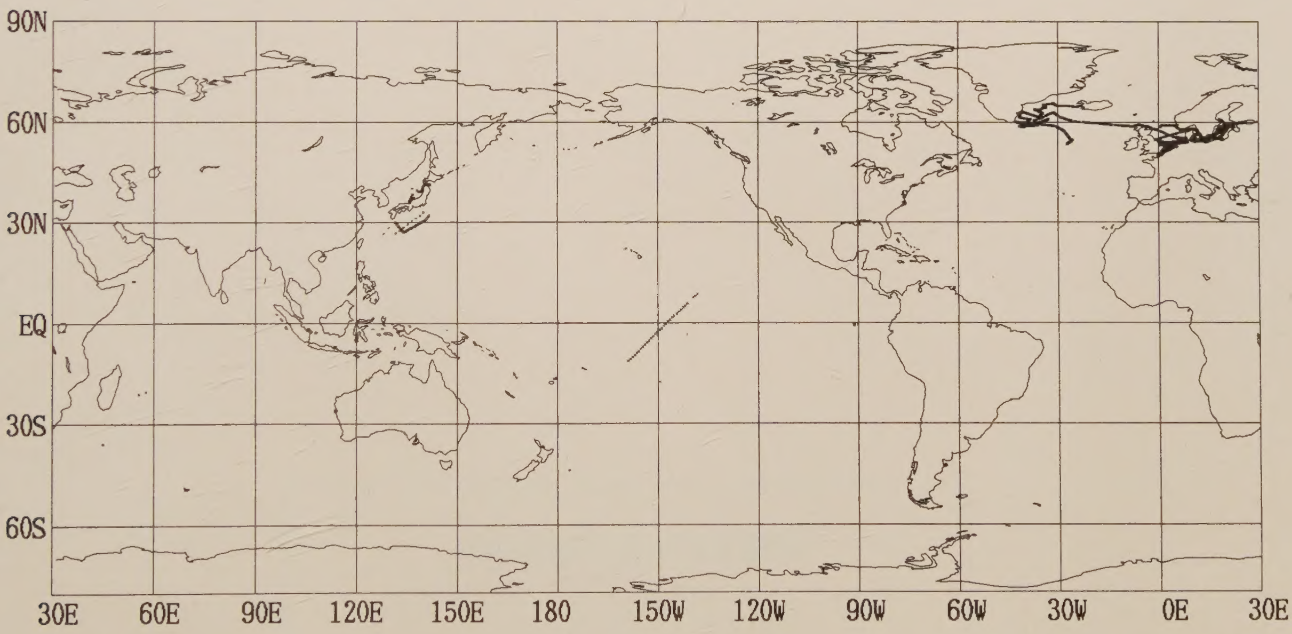
BATHY/TESAC messages Total data: 4723

第29-1図 測点分布図(1997年 8月)

Fig.29-1 Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for AUG 1997.



BUOY messages Total data:197329



TRACKOB messages Total data: 3593

第29-2図 測点分布図(1997年 8月)

Fig.29-2 Geographical distribution of BUOY messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for AUG 1997.

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